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THE OTTAWA MEETING OF THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

Edited by Dr. F. R. MOULTON

PERMANENT SECRETARY

OTTAWA WAS HOST

As was anticipated, the arrangements for the meeting at Ottawa from June 27 to July 2, inclusive, were excellent. Efficient local committees provided for every requirement from finances and meeting places to boy scouts to serve as messengers. There was a fine combination of attention to business details, preparation for scientific sessions, provision for social diversions and a warm spirit of hospitality to visitors. Moreover, the weather was perfect. Ottawa, the capital city of Canada, was indeed host to the association, and those who attended the meeting will long remember it as a delightful occasion.

That the association is American in the broad sense of the word could not be better illustrated than it was at Ottawa. The meeting was not international; it was simply American. The science was not Canadian or United Statesian; it was just science, even though the subject was some geological or biological problem of one or the other of the countries. There was no fine balancing of chairmanships and positions on committees as there is in meetings colored by political considerations. Science was the order of business, and it was conducted in the spirit of perfect harmony and good fellowship.

And why shouldn't a meeting of the association be

wholly free from all considerations of national boundaries? Science is not sectional nor limited to any people. Throughout its history its heroes have appeared in every civilized land, and they have spoken every tongue. The mere fact that I feel it is appropriate to mention these things is a commentary on the low level at which the relations among peoples now largely exist. In the world as a whole the rule of tooth and claw prevails. Perhaps science will be able to initiate an age of reason; certainly the Ottawa meeting tended in that direction.

In order to promote interest in science as widely as possible throughout America, the association holds its meetings in various cities in the United States and Canada. For example, the summer meeting two years ago was held in Rochester, N. Y., and the meeting last summer was held in Denver, Colo. It is hoped that the meeting in Ottawa will add a great impetus to science in Ontario, and indeed throughout Canada. Canadian science has had a distinguished history, as was excellently demonstrated in the symposium on "History of Science in Canada," which was organized and presented by the Section on the Historical and Philological Sciences. Perhaps the Ottawa meeting will mark the close of one period in Canadian science and the beginning of a new one. By a happy coincidence, the council, by unanimous action, voted to admit the British Columbia Academy of Sciences to the relationship of an affiliated society of the association. There are now 31 affiliated academies of science, only one of which is Canadian.

SOME STATISTICAL INFORMATION

From its organization in 1848 until 1902 the association held its meetings, one each year, in the summer, usually in August. Beginning with 1902, the time of the meetings was changed from the summer to the last week in December, including occasionally the first days of January. These winter meetings are the annual meetings of the association. In August, 1915, a summer meeting was held in San Francisco, Calif., in connection with the organization of the Pacific Division. In June, 1922, a summer meeting was held in Salt Lake City, Utah, and in September, 1923, one was held in Los Angeles near the time of a total eclipse of the sun, which was visible from southern California and northern Mexico. In June, 1925, two summer meetings were held, one in Boulder, Colo., in connection with the Southwestern Division, which was organized in 1920, and one in Portland, Oregon, in connection with the Pacific Division. Since 1931 the association has regularly held summer meetings.

In comparing statistics of meetings of the association, it should be remembered that in earlier years only one meeting was held each year, whereas there are

now two. The annual December meeting has been by far the larger of the two, with the exception of the Chicago meeting in June, 1933, in connection with the Century of Progress Exposition.

Canada has been host to the association in five meetings: Montreal, 1857 and 1882; Toronto, 1889 and 1921; and Ottawa, 1938. The first four were regular annual meetings of the association; the last, a summer meeting. Some of the principal statistics relating to the five meetings held in Canada are:

	1857	1882	1889	1921	1938
Members	953	1,407	1,956	11,547	19,307
Registrations	351	937	424	1,832	1,104
Papers	132	255	211	900	466

As has been stated, the statistics for the Ottawa meeting are not comparable with those of earlier years. Perhaps a better comparison would be obtained by combining the figures for the Indianapolis and the Ottawa meetings. For the two meetings together, the number of registrations was 4,198 and the number of papers (including 25 invited discussions) was 2,147.

The registrations at Ottawa were as follows: Alberta, 16; British Columbia, 10; Manitoba, 10; New Brunswick, 17; Nova Scotia, 16; Ontario, 543 (Ottawa, 373); Quebec, 125; Saskatchewan, 16; Prince Edward Island, 2 (total for Canada, 755); Newfoundland, 2; Alabama, 2; California, 5; Connecticut, 14; District of Columbia, 44; Illinois, 16; Indiana, 1; Iowa, 4; Kansas, 2; Louisiana, 1; Maine, 10; Maryland, 3; Massachusetts, 24; Michigan, 15; Minnesota, 7; Missouri, 7; Montana, 1; New Hampshire, 6; New Jersey, 14; New York, 98; North Carolina, 4; North Dakota, 2; Ohio, 13; Oklahoma, 2; Pennsylvania, 20; Rhode Island, 3; South Carolina, 2; Tennessee, 5; Utah, 1; Vermont, 1; Virginia, 6; West Virginia, 3; Wisconsin, 8 (total for United States, 338); Australia, 3; England, 2; Germany, 1; Scotland, 1; South Africa, 1; Sweden, 1.

There were 81 scientific sessions at the Ottawa meeting in addition to 11 field trips, most of which were scientific sessions in a different form, and 9 dinners and luncheons. The sessions were held in 25 rooms, all of which were in use on Wednesday morning. Of the 81 sessions for the reading of papers, 25 were devoted to the 18 symposia which were presented at the meeting. There were in addition 7 round-table discussions.

GENERAL SESSIONS

On Wednesday evening, June 29, Dr. Robert C. Wallace, principal and vice-chancellor of Queen's University, Kingston, Ontario, delivered the seventh Maiben lecture on the subject, "The Changing Values of Science." An audience that filled the large auditorium of Lisgar Collegiate Institute listened with rapt attention to Dr. Wallace's inspiring address.

The other general sessions of the Ottawa meeting were the four programs on "Science and the Future" which were organized and presented by the Section on the Social and Economic Sciences. The speakers at the first session were Dr. Stuart Rice, director of U. S. Central Statistical Bureau, whose subject was "World Standards of Living," and Mr. F. E. Lathe, of the National Research Council of Canada, whose subject was "World Natural Resources." At the second session, Dr. William Crocker, director of Boyce Thompson Institute for Plant Research, spoke on "The Botanical Sciences and the Future," and Dr. Frank R. Lillie, president of the National Academy of Sciences, spoke on "The Zoological Sciences and the Future." The third session was devoted to the physical sciences, Dr. Arthur H. Compton, of The University of Chicago, speaking on "Physics and the Future," and Dr. Harold C. Urey, of Columbia University, on "Chemistry and the Future." In the final session concrete applications of science to producing material things used and useful in the world were discussed by the heads of two great industrial laboratories, Mr. M. W. Smith, of the Westinghouse Electric and Manufacturing Company, and Dr. John Johnston, of the United States Steel Corporation. The subject of Mr. Smith was "The Application of Science to the Electrical Industry" and that of Dr. Johnston was "The Application of Science to the Metallurgical Field."

In all these discussions there were notes of triumph because of remarkable past achievements and expressions of confidence for the future, mingled as never before with feelings of responsibility for the welfare of society. One could not hear the brilliant addresses of these programs without feeling that the epics of our day are being written in the fields of science. It was particularly fortunate that the heads of two great industrial laboratories participated in the discussions, for it will be advantageous for scientists in general to learn how little difference there is between the science of industries and that of the somewhat secluded laboratories of universities. It will be advantageous, too, for university scientists to learn of the breadth of view and the sense of social responsibility of workers in industrial laboratories. And it will perhaps be surprising to representatives of industry to learn that the association is taking a deep interest in the fundamentals on which the industrial and economic life of the world depends.

SYMPOSIA

Including the "Science and the Future" program, which has just been mentioned, 18 symposia were organized and presented at Ottawa. In the order in which they appeared in the General Program of the meeting they are:

1. *Medical Biochemistry* (Section on Chemistry and Section on Medical Sciences. Dr. Harold C. Urey, chairman). "Hormones and Immunity" was discussed by Dr. W. R. Franks and Sir Frederick G. Banting; "Bio-electric and Other Physiological Responses of Insulin and Metrazol," by Drs. J. E. Goodwin, G. E. Hall, B. Leibel and D. P. C. Lloyd; "The Prolongation of the Action of Insulin," by Dr. Albert Fisher; "The Purification of Heparin," by Dr. Arthur Charles; "The Ketogenic and Anti-Insulin Properties of Anterior Lobe Extracts," by Drs. A. H. Neufeld and J. B. Collip; and "Studies on the Specific Metabolic Stimulant of Pituitary Extracts," by Drs. D. K. O'Donovan, O. F. Denstedt and J. B. Collip.

2. *The Nutrition Problem in North America* (Section on Chemistry. Dr. Harold C. Urey, chairman). "Physiological Functions of the Vitamins" was discussed by Dr. E. W. McHenry; "Determination of the Vitamin, Iron and Calcium Requirements of the Human," by Dr. Frederick F. Tisdall; "The Standardization of the Vitamin Content of Cod Liver Oil," by Drs. W. D. McFarlane and A. R. G. Emslie; "Maximum Efficiency with Minimal Diets," by Dr. I. M. Rabinowitch; "Evaluation of Canadian Feeding Stuffs," by Dr. C. J. Watson; "The Role of Pasture in Animal Nutrition," by Dr. E. W. Crampton; "Simplified Diets in Poultry Nutrition," by Dr. H. D. Branion; and "Effect of Diet and Other Factors on the Composition of Fat in the Bacon Hog Carcass," by Dr. R. D. Sinclair.

3. *The Application of Isotopes to Biochemical Problems* (Section on Chemistry and Section on Zoological Sciences. Dr. Harold C. Urey, chairman). "The Concentration of Isotopes" was discussed by Dr. H. G. Thode; "The Use of the Nitrogen Isotope for Biological Studies," by Dr. Rudolf Schoenheimer; "The Application of Deuterium to Intermediate Metabolism," by Dr. David Rittenberg; and "Pharmacological and Toxic Effects of Deuterium Oxide," by Dr. Henry G. Barbour.

4. *Atmospheric Ozone and Measurement of Ultra-Violet in Solar Radiation* (Section on Astronomy and Royal Astronomical Society of Canada). "Atmospheric Ozone as a Constituent of the Atmosphere" was discussed by Dr. B. Haurwitz; "Ozonosphere Temperatures under Radiation Equilibrium," by Dr. E. H. Gowan; "Atmospheric Ozone as related to Meteorology," by Dr. Chaim Pekeris; and "The Determination of Atmospheric Ozone from the Measurement of Ultra-Violet Solar Radiation," by Dr. Brian O'Brien.

5. *The Migration of Salmon—and Conservation*. (Section on Zoological Sciences and Ecological Society of America. Dr. A. G. Huntsman, chairman). "The Atlantic Salmon of Europe" was discussed by Mr. W. J. M. Menzies, of Edinburgh, Scotland; "The

Pacific Salmon of Alaska and the Western States," by Dr. W. H. Rich; "The Pacific Salmon of British Columbia," by Dr. W. A. Clemens; "The Atlantic Salmon of the Gulf of St. Lawrence," by Dr. D. L. Belding; "The Atlantic Salmon of Nova Scotia and New Brunswick," by Dr. A. G. Huntsman; and "Factors Controlling Salmon Migration," by Dr. Henry B. Ward.

6. *The Relation of Insects to Forest Conservation* (Entomologists, Foresters and Forest Pathologists. Dr. J. M. Swaine, chairman). "Cooperation in Insect Studies Relating to Forest Conservation" was discussed by Dr. J. J. deGryse; "Some Economic Aspects of White Pine Blister Rust Control," by Dr. J. F. Martin; "The Relation of Insects and Other Biotic Factors to the Development of the Modern Forest," by Dr. S. A. Graham; "The Relation of Insects to Rehabilitation Plantations in Drought Areas," by Dr. N. D. Wygant; and "The Relation of Insects to the Conservation of Farm Woodlots," by Dr. R. B. Friend.

7. *The Genetics of Pathogenic Organisms*. Viruses, Protozoa, Bacteria and Fungi Pathogenic to Plants. (Section on Botanical Sciences, Section on Medical Sciences, Section on Agriculture, American Phytopathological Society and Genetics Society of America). *Viruses*: "Viruses Pathogenic to Animals" was discussed by Dr. E. A. Watson; and "Viruses Pathogenic to Plants," by Dr. L. O. Kunkel. *Protozoa*: "Genetics of the Parasitic Protozoa" was discussed by Drs. W. H. Taliaferro and C. G. Huff; and "The Influence of Host Constitution on the Parasite," by Dr. C. G. Huff. *Bacteria*: "Some Problems in the Genetics of Bacteria Pathogenic to Man" was discussed by Dr. G. B. Reed; "Some Examples of Hereditary and Environmental Influence on Bacterial Pathogenicity," by Dr. H. Konst; and "Genetics of Bacteria Pathogenic to Plants," by Dr. A. J. Riker. *Fungi Pathogenic to Plants*: Under the general title "The Origin of Parasitic Races of Phytopathogenic Fungi" there were the following four papers: "Origin through Adaptation," by Dr. D. Riddick; "Origin through Hybridization—in Smut Fungi," by Dr. H. A. Rodenhiser; "Origin through Hybridization—in Rust Fungi," by Dr. J. H. Craigie; and "Origin through Mutation," by Dr. J. J. Christensen.

8. *Micro-elements and Deficiency Diseases* (American Phytopathological Society and American Society of Plant Physiologists). Under the general title "Micro-elements in Nutrition of Plants" there were the following three papers: "Review of Literature," by Drs. M. B. Davis and E. P. Grant; "Micro-element Studies at Experimental Farm" (illustrated), by Drs. W. Ferguson and L. E. Wright; and "Microspectrographic Studies," by Dr. G. R. Giles. The remaining papers were as follows: "Spectrographic Analysis

Applied to Trace Elements," by Dr. J. S. Foster; "Some Relations of Micro-elements to Animal Life," by Dr. E. J. Underwood; "Boron Deficiency Symptoms in Agricultural Plants in British Columbia," by Dr. H. R. McLarty; "Cytology of Deficiency Diseases with Special Reference to Boron," by Dr. J. Coulson; "Thallium Toxicity," by Dr. E. L. Spencer; and "Permeability of Host Cells in Relation to Fungus Parasites," by Dr. F. S. Thatcher.

9. *Phytogeographical Problems of Northeastern Canada* (Section on Botanical Sciences, Botanical Society of America and American Society of Plant Taxonomists. Dr. M. L. Fernald, presiding). "Botanical Evidence of a Post-pleistocene Marine Connection Between Hudson Bay and the St. Lawrence Basin" was discussed by Dr. David Potter; "The Phytogeographical Implications of the Flora of Northeastern Labrador," by Dr. Ernst C. Abbe; "Some Factors in the Isolation of Rare Plants," by Dr. V. C. Wynne-Edwards; "The Bic Florula and its Bearing on the General Problem," by Dr. Jacques Rousseau; and "The Mingan-Anticosti Phytogeographical Problem," by Frère Marie-Victorin.

10. *Root Rots and Seed Borne Diseases* (Canadian Phytopathological Society and American Phytopathological Society. Dr. H. W. Anderson, chairman). "Relation of Plant Pathological Technique to Seed Laboratory Practice" was discussed by Dr. R. Howard Porter; "The Incidence of Pathogenic Fungi in Seeds," by Dr. G. A. Scott; "The Role of Infected Seed in the Development of Seedling Blight and Root Rot in Cereals," by Dr. J. J. Christensen; "The Soil Microflora and other Factors Affecting the Development of Root Rot," by Dr. F. J. Greaney; "Root Development in Relation to Root Rot Diseases," by Dr. P. M. Simmonds; and "The Interrelation of Organisms to Root Rot," by Dr. G. B. Sanford.

11. *Drought Relations* (American Society of Plant Physiologists and Genetics Society of America). "Xerophytic Plants, their Evolutionary Origin from Mesophytes and their Possible Utilization in Culture or as Plant Breeding Material" was discussed by Dr. Walter T. Swingle; "Studies on the Physiology of Drought Resistance in Cereals," by Dr. A. G. O. Whiteside; "Similarities between Drought and Frost Resistance," by Dr. J. Levitt; "Water Absorption as a Factor in Drought Injury," by Dr. Paul J. Kramer; "Water Economy of Trees in Relation to Drought," by R. D. Gibbs; "Effect of Cultivation on Soil Moisture Relations," by Drs. W. J. Staple and J. Lehané; "Comparative Development of Drought Resistant Wheat Varieties under Varying Moisture Supply," by Dr. J. W. Hopkins; "Root Studies of Weed and Crop Plants," by Drs. T. K. Pavlychenko and L. E. Kirk; "The Problem of Breeding Wheat for Resistance to

Drought," by Dr. K. W. Neatby; "Triticum-Agropyron Hybrids for Drought Areas," by Drs. F. H. Peto and L. V. P. Johnson; and "The Influence of Moisture Supply on the Drought Resistance of Pine Seedlings," by Dr. Hardy L. Shirley.

12. *Science and the Future* (Section on Social and Economic Sciences). Program was discussed under the heading "General Sessions."

13. *The Influence of Fire on Forests, Wild Life and Public Welfare* (American Association, Ecological Society of America, Society of American Foresters and Canadian Society of Forest Engineers. Dr. C. C. Adams, presiding). "Fire and Forests" was discussed by Dr. Irvine T. Haig; "Fire and Wild Life," by Dr. Hoyes Lloyd; and "Fire and Land Use," by Dr. Herbert C. Hanson.

14. *The Present Status of the Psychology of Thinking* (Section on Psychology. Dr. George Humphrey, chairman). Under the general title of the symposium, three comprehensive papers were presented, after which there were discussions by invited speakers. Dr. George Humphrey discussed the history and development of this field in scientific psychology; Dr. N. R. F. Maier reported on animal and human experiments on the nature of reasoning; and Dr. S. N. F. Chant described recent experiments which separate analogical and analytical processes in reasoning.

15. *History of Science in Canada* (Section on Historical and Philological Sciences). "The Advance of Physics in Canada" was discussed by Dr. A. Norman Shaw; "The Beginnings of Chemistry in Canada," by Dr. W. Lash Miller; "Canada's Contributions to Botany," by Frère Marie-Victorin; "The History of Zoology in Canada," by Dr. J. R. Dymond; "The History of Geology in Canada," by Dr. Frank D. Adams; "The Growth of Astronomy in Canada," by Dr. W. E. Harper; "An Outline of the Progress of Mathematics in Canada," by Dr. Samuel Beatty; "Medical Research during the French Régime," by Dr. L. E. Pariseau; and "Why the Social Sciences Lag behind the Biological and Physical Sciences," by Dr. Joseph Mayer.

16. *Bacillus Calmette-Guérin* (B.C.G.) (Section on Medical Sciences). "B.C.G. Vaccine, Eleven Years' Experimental Work on Its Innocuity and Efficacy" was discussed by Dr. A. Frappier; "B.C.G. Vaccination of Cattle and Resistance to Tuberculosis," by Dr. E. A. Watson; "The Immunizing Properties of B.C.G. Vaccine in Bovines," by Dr. Allan C. Rankin; "Vaccination of Indian Children with B.C.G., Progressive Report," by Dr. R. G. Ferguson; "Twelve Years' Experience with B.C.G. Vaccine at the University of Montreal," by J. A. Baudouin; and discussion led by Dr. Wm. H. Park.

17. *Progress of Swine Improvement in Canada*

(Canadian Society of Technical Agriculturalists and Canadian Society of Animal Production). "Advanced Registry for Pure-bred Swine" was discussed by Dr. A. W. Peterson; "Test Station Operation," by Dr. R. G. Knox; "Discussion of the Results of Station Testing in Canada," by Dr. J. G. Lefebvre; "Analysis and Interpretation of Carcass Results," by Dr. E. W. Crampton; "Discussion of Recent Investigations in Carcass Evaluation," by Dr. J. G. Stothart; and "Market Quality of Canadian Bacon," by Dr. L. W. Pearsall.

18. *Comparison of Nutritive Value of Pasture and Hay with Other Crops* (American Society of Agronomy. Dr. O. McConkey, presiding). "Problems in Evaluating Pastures in Relation to Other Crops," by Drs. H. L. Ahlgren, G. Bohstedt and O. S. Aamodt; "Comparative Cost of Total Digestible Nutrients in Pasture and Other Crops," by Drs. E. S. Hopkins and P. O. Ripley; "Seasonal Variations in Chemical Composition of Pasture, Hay and Grain from Different Regions in Ontario," by Dr. N. J. Thomas; "Relative Values of Alfalfa Hay and a Mixture of Concentrates for Milking Cows," by Dr. T. E. Woodward; "Methods of Evaluating Live Stock Feeds," by Dr. F. B. Morrison; "Remarks on Evaluation of Herbage and Pasture," by Dr. Paul E. Howe; and "Some Problems in the Determination of the Nutritive Value of Pasture Herbage," by Dr. E. W. Crampton.

A number of programs listed as round-table conferences did not differ greatly in their general plan from some of the symposia. Others were somewhat informal discussions of closely related subjects. The programs of several of the sections and societies were thoroughly organized in subject-matter, yet were not designated either as symposia or round-table conferences. For example, the Section on Geology and Geography had six sessions, each on a different well-defined field of geological interest. Since the council at the Indianapolis meeting last December authorized the publication by the association of such symposia as the executive committee may approve of, a clear formulation of the conditions under which a program should be designated as a symposium becomes important. Such a formulation is also important in preparing a balanced report of a meeting of the association. Perhaps the subject should be discussed and a definition given of the word symposium at the Secretaries' Conference at the Virginia meeting next December.

BUSINESS ITEMS

At its first meeting on Monday, June 27, the council appointed Dr. Wesley C. Mitchell, president of the association, Dr. George D. Birkhoff, the retiring president, Dr. F. R. Moulton, the permanent secretary, Dr. Earl B. McKinley, member of the executive committee,

Dr. Herbert E. Ives, vice-president of the association and chairman of the section on physics, Dr. H. G. Moulton, formerly vice-president of the association and chairman of the Section on Social and Economic Sciences, to represent the association in discussions with representatives of the British Association for the Advancement of Science, at its Cambridge meeting in August, on the question of closer cooperation between the two associations and of other subjects of mutual interest.

At the same session the council adopted the following resolution:

WHEREAS: The American Association for the Advancement of Science, realizing the fact that the holding of international congresses or meetings for the purpose of discussing science and human welfare serves fundamentally to advance understanding among the nations, hereby approves in principle lending its influence and support to further the plans of such congresses or meetings when arranged or sponsored by any of its affiliated societies or by other organizations of corresponding standing.

The permanent secretary reported that the total membership of the association on June 21 was 19,307; on June 22, 1937, it was 18,353. Between the beginning of the fiscal year, October 1, 1937, and June 21, 1938, the names of 1,925 new members had been added to the rolls of the association; the estimate made last October for the number of new members that would be added in the entire year was 1,300.

The permanent secretary reported that 23 broadcasts were delivered between January 19, the date of the first broadcast of the series, and June 27, and that in response to written requests for copies of the scripts 143,400 had been sent out to listeners.

In response to a request from the World Education Federation, the council appointed Dr. Otis W. Caldwell, general secretary, and Mr. H. A. Carpenter to organize the program of the Science Section meetings of the Federation to be held in Rio de Janeiro, Brazil, in the summer of 1939.

The council appointed Colonel C. F. Craig, Tulane University Medical School, New Orleans; Dr. Mark F. Boyd, Rockefeller Institute for Medical Research, New York, and Dr. Louis L. Williams, U. S. Public Health Service, Washington, as a supervisory committee for the development of a three-year program on malaria, closing with a comprehensive symposium on the subject at the meeting in December, 1941.

For the purpose of increasing the service of the association to its affiliated academies of science, the council passed the following resolution:

Resolved, that the officers of the Association be authorized and instructed to offer to each of the affiliated Academies of Science the privilege of nominating for annual Honorary Junior Membership in the Association

one boy and one girl from its junior academy or, if it has no junior academy, from junior science clubs within its territory; and that the Association in thus providing for Honorary Junior Memberships shall arrange so that during the period of honorary membership the honorary junior member shall pay no entrance fee or dues, shall receive a suitable certificate of membership, the copies of SCIENCE containing the preliminary announcements and the reports of the meetings, the programs of the meetings; and also Science News Letter, provided through the courtesy of Science Service.

The Committee on the Theobald Smith Award in Medical Sciences reported its selection of Dr. Charles F. Code, of the Mayo Foundation, Rochester, Minn., as the second recipient of the \$1,000 award for his work on "Histamine in the Blood." The report was unanimously accepted by the council. The secretary of the Section on Medical Sciences was appointed to be secretary of the Theobald Smith Award Committee in Medical Sciences.

Dr. J. F. Dashiell, of the University of North Carolina, Chapel Hill, N. C., was elected by the council as vice-president of the association and chairman of the Section on Psychology.

Dean Edward Spease, of Western Reserve University, Cleveland, Ohio, was appointed a member of the executive committee of the Subsection on Pharmacy.

The council by unanimous vote accepted the British Columbia Academy of Sciences as an affiliated academy of the association. This is the first Canadian academy to be admitted as an affiliated academy. The number of scientific societies, academies and organizations now affiliated or associated with the association is 166.

Just before its final adjournment on June 30, the council, in appreciation of the courtesies extended to the association by the citizens of Ottawa and of Canada, unanimously adopted the following resolution:

The American Association for the Advancement of Science and its affiliated societies hereby express their deep appreciation to the citizens of Ottawa and of Canada for acting as hosts to the One Hundred-Second Meeting of the Association, which was held in Ottawa, Ontario, from June 27 to July 2, 1938, inclusive. At this meeting there were more than 100 scientific sessions before which nearly 500 papers were presented. The registered attendance exceeded 1,100, which ranks the Ottawa meeting among the largest summer meetings the Association has held.

Not only has the Ottawa meeting been exceptional in point of attendance and in number of scientific papers presented, but as the result of the work of a splendid Local Committee provisions for its scientific sessions and for the entertainment of members and their guests have been ideal. His Excellency, Lord Tweedsmuir, was Patron of the Meeting; Senator Raoul Dandurand, Honorary

Chairman of the Local Committee; Dr. C. Camsell was Chairman of the Local Executive Committee; Drs. A. Beauchesne and R. W. Boyle were Vice-Chairmen, Drs. A. Lanetot and H. M. Tory were Executive Members; and Mr. H. L. Trueman was Secretary. To the special Committee Chairmen, N. C. Allen, Finance; E. Rhoades, Publicity; F. E. Lathe, Program; T. A. McElhanney, Equipment; L. S. McLaine, Registration; C. H. Bland, Staff, and M. F. Gregg, Entertainment, the Association owes especial thanks for the great success of the meeting. Moreover, the Boy Scouts of Canada, alert and ever ready for action, rendered varied and effective services that helped make the machinery of the meeting function smoothly. All visitors will long hold pleasant memories of Ottawa as a delightful city and of its inhabitants as ideal hosts.

The meeting that was held this week is the fifth meeting of the Association in Canada, for the Association is American in the broad sense of the word. In science on this continent national boundaries are of no consequence. The participants in this meeting considered together in harmony and good will more fundamental things than political rivalries. If the spirit of this meeting extended throughout the world, many of the troubles that now afflict mankind would not exist.

The daily papers of Ottawa and of Canada, with fine discrimination of what is important and in the sincere spirit of science, have given this meeting a great deal of publicity. The Canadian Broadcasting Corporation has carried a number of broadcasts. In fact, from the very beginning of the preparation for this meeting to its close, the citizens and institutions of Ottawa and of Canada rendered services to the Association and its affiliated societies which the Council here gratefully but inadequately acknowledges.

SCIENTIFIC SESSIONS

SECTION ON PHYSICS (B)

(From report by Henry A. Barton)

Section B held three sessions, at which 16 papers were read, Herbert E. Ives, chairman of the section, presiding. The program, arranged by J. A. Gray, of Queen's University, Ontario, was unusually strong for a summer meeting. Visiting physicists enjoyed the opportunity of visiting the National Research Laboratories, in which the scientific sessions of the section were held.

The first session consisted of four short papers on such miscellaneous subjects as low frequency currents, specific heats of gases and applications of spectrophotometry to blood pigments, and a special paper by H. E. Ives on "The Unsymmetrical Doppler Effect in Hydrogen Canal Rays and its Significance in Optical Theories." Using canal ray tubes of the type devised by Dempster, Ives found that the displacement of spectral lines was exactly the amount predicted by the Larmor-Lorentz theory, according to which a moving clock runs slow. The next session consisted of three invited papers on sound, two on ultrasonic waves. F. H. Sanders presented a paper on "Passage of Ultra-

sonic Waves through Thin Plates," and R. W. Boyle presented one on "Ultrasonics—Marine Applications." The third paper, by H. E. Reilley, was on "Noise Abatement Problems in Canada." At the final session 8 short papers were read.

SECTION ON CHEMISTRY (C)

There were five sessions of the Section on Chemistry, the third of which was a joint symposium with the Section on Medical Sciences on "Medical Biochemistry" (item 1 under Symposia) and the fifth of which was a joint symposium with the Section on Zoological Sciences on "The Applications of Isotopes to Biochemical Problems" (item 3 under Symposia). The fourth session was devoted by the section to a symposium on "The Nutrition Problem in North America" (item 2 under Symposia). The first session consisted of three papers on "Gas Reactions" and the second of six papers on miscellaneous subjects ranging from physical and chemical aspects of textile fibers to the refining of radium ores. A total of twenty-seven papers were presented before the section.

SECTION ON ASTRONOMY (D) AND ROYAL ASTRONOMICAL SOCIETY OF CANADA

(From report by Harlan T. Stetson)

The section and the Royal Astronomical Society of Canada held three sessions, the first two of which were general sessions, and the third of which was a symposium on "Atmospheric Ozone and Measurement of Ultra-violet in Solar Radiation" (item 4 under Symposia). A total of thirty papers was presented. At the first session W. E. Harper, in his discussion of "Fifty Years of Astronomical Work in Canada," outlined the remarkable progress of astronomy in Canada from the days in which a small transit was the only official observing instrument to the present great 72-inch reflector at Victoria, B. C., and the 74-inch reflector at the David Dunlap Observatory. The remainder of the program included a wide range of subjects—the relation of terrestrial phenomena to the solar cycle; sunspot influence on the tree growth in Canada with correlations opposite in sign for the coastal regions from those for the interior; statistics on distribution of sunspots in longitude; a spectroscopic attempt to determine whether the greenish areas on Mars owe their color to vegetation, a negative conclusion being indicated; navigation near the pole; variable stars in globular clusters; orbits of spectrographic binary stars; solar rotation measurements; and radial velocities of certain stars.

SECTION ON GEOLOGY AND GEOGRAPHY (E) AND THE GEOLOGICAL SOCIETY OF AMERICA

(From report by Howard A. Meyerhoff)

The section held two sessions, one of five papers on "Regional Geography" and one of five papers on "Geo-

graphic Problems of the Northern Frontier," and four joint sessions with the Geological Society of America, the general subjects of which were "Physiography," "Aspects of the Mineral Industry," "Precambrian Economic and Stratigraphic Geology" and "Precambrian and Paleozoic Geology." In addition to the six formal sessions, several field trips were arranged, one of two and one-half days under the guidance of Morley E. Wilson to examine the Precambrian geology in the Madoc District; one to the laboratories of the Bureau of Mines; another, under the leadership of Dr. Alice Wilson, stratigraphically upward through the Paleozoic section of the Ottawa Lowland; and another, under D. A. Nichols, on physiography and geography, including an inspection of local pulp and power operation. Not satisfied with the six days allowed for the regular meetings and excursions, thirteen members of the section and its affiliated society extended their activities from July 2 to July 7 by a trip, arranged by Dr. Timm, director of the Bureau of Mines, and under the guidance of Mr. Parsons, to the Hollinger, McIntyre, Dome, Noranda, Wright-Hargreaves and other mines. The great success of the scientific sessions and the excursions, in which ninety persons participated at least in part, was due largely to Walter A. Bell and other Canadian geologists.

SECTION ON ZOOLOGICAL SCIENCES (F) AND AFFILIATED SOCIETIES

The Section on Zoological Sciences presented a symposium on "The Migration of Salmon—and Conservation" (item 5 under Symposia), a joint symposium with the Section on Chemistry on "The Application of Isotopes to Biochemical Problems" (item 3 under Symposia) and a joint program with the Ecological Society of America.

The American Association of Economic Entomologists, the Entomological Society of America and the Entomological Society of Ontario held a symposium under the chairmanship of J. M. Swaine on "The Relation of Insects to Forest Conservation" (item 6 under Symposia) and three joint sessions at which twenty-three papers were read. At the first session, under the chairmanship of Arthur Gibson, such varied subjects were considered as wireworms of Canada, wind drift and dissemination of insects, ticks as vectors of animal diseases and methods of estimating the populations of insects in a field. Before the second session, with A. L. Melander serving as chairman, papers were read on a variety of subjects, including "Increasing Demands upon Entomologists," "The Male Genitalia of Insects," "Thirty Years' Experience with Orchard Sprays in Nova Scotia," "Synthetic Compounds that Look Promising as Insecticides," "Ephemerid Coloration and Its Relation to the Time of Emergence" and

"Insect Life as Recorded by the Motion Picture Camera." Dr. J. J. Davis was chairman of the final session before which nine papers were presented on such subjects as "The European Sawfly in Eastern Canada," "An Economic Appraisal of Grasshopper Outbreaks and Control in Saskatchewan; a Progress Report" and "Biological Control of Insects through Plant Resistance."

SECTION ON BOTANICAL SCIENCES (G) AND AFFILIATED SOCIETIES

(From reports by J. T. Buchholz, D. B. O. Saville and M. J. Adams)

The societies presenting programs in the field of the botanical sciences were the Canadian Phytopathological Society, the American Phytopathological Society, the American Society of Plant Physiologists, the Botanical Society of America and the American Society of Plant Taxonomists. The section held a joint symposium with the Botanical Society of America and the American Society of Plant Taxonomists on "Phytogeographical Problems of Northeastern Canada" (item 9 under Symposia). The section also held a session for the presentation of general papers, with Frère Marie-Victorin presiding. The program included ten papers. R. B. Thomson presented two illustrated papers. Phyllis Cook compared the oriental and occidental species of *Thuja*; J. T. Buchholz made an embryological comparison of two species of *Sequoia*. Jules Brunel gave an account of a most interesting study of the Desmid flora of a recent peat bog from a study by Frère Irenne-Marie, which disclosed, from samples taken at all times of the year, thousands of species of these microscopic plants. A. H. Hutchinson described a polygonal method of graphing ecological data by which the relationships of many complex variables affecting the environmental relationships of plants may be more adequately represented for comparison.

The sessions of the American Phytopathological Society took the form of three symposia held in cooperation with other groups. The first of these, entitled "The Genetics of Pathogenic Organisms" (item 7 under Symposia), was held with the sections on the Botanical Sciences, Medical Sciences and Agriculture and the Genetics Society of America. While discussion of the fungi was limited to plant pathogens and that of the protozoa to animal pathogens, viruses and bacteria were considered in connection with both plant and animal diseases. Of necessity the information presented dealt chiefly with the changes observed in pathogenic organisms and the permanence of such changes, since sexual reproduction and the possibility of true genetic studies is practically confined to the fungi. The close similarity observed in the findings of the workers in the

different fields was in itself an argument in favor of such combined sessions. One was left with the impression that in the simpler organisms, where reproduction is at least largely asexual, frequent variations (possibly true mutations) largely take the place of genetic changes brought about by hybridization. The production of new races of pathogens through adaptation to new hosts and through spontaneous variation was described for all types of organisms. New methods of technique have made it possible to separate numerous variants of some of the plant viruses; some of these persist indefinitely without reversion to the original type. Breeding work with the fungi is still in its infancy, but interesting reports on hybridization in the rusts and smuts showed that forms, new in both morphology and pathogenicity, can arise in this way and probably do so in nature; inheritance seems to obey Mendelian principles at least in part.

The second symposium, "Micro-elements and Deficiency Diseases" (item 8 under Symposia), was held in joint session with the American Society of Plant Physiologists. This session was largely concerned with the various disorders, especially in apples and turnips, caused by a deficiency of boron. It was shown that, although boron is now known to be essential to a great many important plants, no use has yet been proved for it in the animal body. Many of these minor elements, even if essential, are toxic if present in more than minute amounts. A disease of tobacco, similar to and perhaps identical with frenching, due to thallium toxicity was given as an example of this fact. Methods of spectrographic analysis for rapid estimation of various elements in plant tissue and in soil were described.

The final symposium was held in conjunction with the Canadian Phytopathological Society, the subject being "Root Rots and Seed Borne Diseases" (item 10 under Symposia). Many figures showing the value of seed treatment and the high percentage of fungus infection sometimes found in prize-winning seed samples suggested the advisability of extending the scope of seed testing.

In the discussion of root rots the complexity of studies on this important group of diseases was stressed; the host, pathogen and soil microflora all influence each other.

At the garden party on Tuesday at the Central Experimental Farm, plant pathologists had an opportunity to examine exhibits of the Division of Botany and Plant Pathology of Canada.

Besides joining with the American Phytopathological Society in the symposium on "Micro-elements and Deficiency Diseases," the American Society of Plant Physiologists joined the Genetics Society of America in a symposium on "Drought Relations" (item 11

under Symposia) and in addition had a general program of six papers.

The Botanical Society of America and the American Society of Plant Taxonomists participated with the Section on Botanical Sciences in the symposium on "Phytogeographical Problems of Northeast Canada" (item 9 under Symposia). Papers bearing on the subject were presented by Ernst C. Abbe, V. C. Wynne-Edwards and Jacques Rousseau. In the absence of Frère Marie-Victorin, his paper on the Mingan-Anticosti Flora was presented by Jacques Rousseau. Owing to the absence of David Potter, his paper on a possible floral connection between James Bay and the Ottawa River Valley was not read. The general consensus of opinion was that the "nunatak" theory as a possible explanation of the discontinuity in the distribution of various plant species has been considerably overworked.

After the symposium there was a luncheon for all biologists in the Chateau Laurier, at which a large number of botanists and zoologists were present. The visitors were welcomed in a short address by A. G. Huntsman, of Toronto, to which E. G. Conklin, of Princeton, fittingly responded.

The garden party in the afternoon on the lawn of the Central Experimental Farm was one of the largest and most representative with which Ottawa has been honored. The weather was ideal and the musical program was supplied by the band of the Governor-General's Footguards. In addition to the tents for the catering service, there were two others containing exhibits of the various kinds of scientific work—botanical, entomological, etc.

For the field trips on three successive days typical plant habitats were chosen, the woods surrounding King's Mountain, the sandy soil at Constance Bay and the peat bog at Mer Bleue. In addition to a number of members of the staff of the Division of Botany and the National Herbarium at Ottawa, as well as Toronto University, there were also representatives from Cornell and Harvard Universities, the U. S. Bureau of Plant Industry, the Brooklyn Botanic Garden and the New York Botanic Garden. Scientists were present from states as far apart as Louisiana, Illinois and Maine. On the first trip after the visit to King's Mountain, most of the party traveled up the picturesque Gatineau Valley as far as Wakefield, then along the Lapêche River Valley as far as Masham Mills, and then across country through the hills to Eardley with several stops for the collection of plants. From Eardley the party returned along the base of the mountains to Ottawa, a total distance of about eighty miles. Although the weather turned slightly rainy on the day scheduled for the trip to Mer Bleue, and notwithstanding the fact that it was a national holiday, the excursion was one of the best attended of the three.

ECOLOGICAL SOCIETY OF AMERICA AND GENETICS SOCIETY
OF AMERICA

The Ecological Society of America held two joint sessions with the Society of American Foresters and the Canadian Society of Forest Engineers. The first was for the presentation of a symposium on "The Influence of Fire on Forests, Wild Life and Public Welfare" (item 13 under Symposia) and the second was a general program, under the chairmanship of C. F. Korstian, of three papers on forest questions. These societies participated in field trips to Mer Bleue and the Petawawa Forest Experiment Station.

The Genetics Society of America joined with the Sections on Botanical Sciences, on Medicine and on Agriculture and with the American Phytopathological Society in a symposium on "The Genetics of Pathogenic Organisms" (item 7 under Symposia). It also presented jointly with the American Society of Plant Physiologists a symposium on Drought Relations (item 11 under Symposia) and it held a program of eleven cytogenetic demonstration papers.

SECTION ON ANTHROPOLOGY (H)

(From report by Diamond Jenness)

Section H held sessions on three days, at which nineteen papers were presented. The average attendance was eighteen. As was natural at a meeting held in Canada, problems relating to the anthropology and ethnology of that dominion had a prominent place. It was emphasized that prehistoric Canada has played two major roles: (1) that it has offered a home or a passage to ancient peoples migrating from Asia to America; and (2) that it has also been an area of specialization for certain tribes that evolved either within its borders or farther south. T. F. McIlwraith and J. F. Davidson described peculiar features in the religion of two of these tribes, while C. W. M. Hart analyzed the marriage arrangements of a third. Definite cultural links between Asia and America are notoriously hard to establish, but C. M. Barbeau emphasized the close resemblances between the dirge songs of the Northwest coast and old Buddhist chants in China and Mongolia, while Earl Count showed that some folk-lore motifs common to America and Eurasia have apparently stemmed from a common source. Certain writers have ascribed a Siberian origin to the Woodland pottery of eastern Canada and the north-eastern United States, but W. J. Wintenberg drew attention to the vast potteryless gap in northern Canada that we must bridge before establishing a connection between the two regions. The vexed question of the origin of the Iroquois was reopened by J. Griffin, who suggested that present archeological and linguistic evidence does not support the hypothesis of a middle Mississippi homeland, and that the Iroquoians

may have developed from a Woodland background. D. Leechman described some new discoveries of Dorset Eskimo remains in the Arctic. A very important contribution to the problem of early migration in the Western Hemisphere was made by Junius Bird, who suggested that if the earliest Indians to occupy South America were ignorant of water transport and traveled solely on foot, as seemed to be indicated by his discoveries around the Straits of Magellan, then we should eliminate the Amazon basin from their route and seek their traces in northern Peru along the western side of the Marañon valley.

Three papers dealt with those cultural conflicts and interchanges of primitive with advanced groups that are as important to the practical administrator as to the anthropologist. In the field of physical anthropology, Saunders and Count outlined a new method of graphing dimensions and indices, and J. C. B. Grant described the Stony Indians of Alberta, whose blood-grouping differs quite unaccountably from that of the neighboring Blackfoot. W. M. Krogman offered an outline of the ethnic photohistory of the Near East by stating a chronological sequence of racial types, beginning with the South Europid, which was uniformly present by 4000 B. C. or earlier, the North Europid, which became an important element only in the middle or late 34th millennium B. C., the Central Europid, which came in between 3000 and 2500 B. C., and the Armenoid, which did not appear in Western Asia until about 500 B. C.

At the close of the session several members of Section H accepted the invitation of Dr. C. T. Currelly to visit the Royal Ontario Museum of Archeology in Toronto, whose magnificent Chinese collections had formed the subjects of several papers during the meetings.

SECTION ON PSYCHOLOGY (I)

(From report by Leonard Carmichael)

The Section on Psychology (I) held six scientific sessions from Tuesday to Thursday. Two of these sessions were held jointly with the Section on Education (Q). A dinner for psychologists was held on Wednesday evening under the chairmanship of E. A. Bott, of the University of Toronto. At this dinner, a new Canadian Psychological Association was formed. A detailed announcement concerning the formation of this association, the officers selected, and so forth, will be found elsewhere in SCIENCE.

Probably the most notable part of the scientific session was a symposium (item 14 under Symposia) organized and directed by George Humphrey of Queen's University on the present status of the psychology of thinking. Professor Humphrey himself contributed the first paper of the symposium. He dealt with the history and development of this field in scientific psy-

chology. He pointed out that the subject of thought, technically defined, has received too little attention by professional psychologists in recent years. N. R. Maier, of the University of Michigan, reported on certain animal and human experiments regarding the nature of reasoning which seem clearly to show the distinction between reasoning and memory. S. N. F. Chant, of the University of Toronto, described certain of his recent experiments, which include the separation of analogical and analytical processes in reasoning. After these three major papers, there was a series of brief statements given by those who had been asked in advance to discuss the papers. The second section on social psychology was under the direction of E. A. Bott. The detailed program of papers presented at this session and at the other sessions of the section has been published elsewhere in *SCIENCE*. This is also true of the joint session with the Section on Education (Q), held under the chairmanship of J. G. Althouse. The sessions on general psychology and learning, under the chairmanship of J. G. Beebe-Center, included a series of theoretical and experimental papers. In one of these papers, Frère Philip, of LaSalle College, Philadelphia, described the application of certain mathematical procedures, first devised for the treatment of earthquake records, to the study of the periodicity of the high-speed continuous work of human subjects. The session on physiological psychology and problems of adjustment was under the chairmanship of Leonard Carmichael, of the University of Rochester. The final session of the program on vocational selection and tests was under the chairmanship of R. B. Liddy, of the University of Western Ontario.

In all, thirty-three major papers were presented before the section. The meetings of the section were held, through the kindness of the authorities of the University of Ottawa, in the lecture rooms of that institution. The programs were marked by excellent discussion, and all in all the meeting of Section I at Ottawa must be considered as one of the most successful summer meetings of the section ever held. To E. A. Bott goes the entire credit for the excellent arrangement of the program.

SECTION ON SOCIAL AND ECONOMIC SCIENCES (K) AND THE AMERICAN STATISTICAL ASSOCIATION

*(From the report of Frederick F. Stephan
for the latter)*

The program of the Section on Social and Economic Sciences consisted of four sessions on "Science and the Future," this being the second conference of a series of five conferences on the general subject "Science and Society." These sessions, held in the auditorium of Lisgar Collegiate Institute, all had the character of General Sessions, described earlier in this report.

The program of the American Statistical Association linked Canadian and American statisticians and economists in a discussion of timely subjects. The program opened with a critical examination of the statistical series that may be used in comparing the fluctuations of economic conditions in Canada and the United States, presented by D. C. MacGregor, of the University of Toronto. In the second paper at the opening session Walter Gardner, of the Board of Governors of the Federal Reserve System, analyzed the influence of the United States on the course of business in Canada, emphasizing monetary and financial relationships between the two countries.

The second session was devoted to a scrutiny of the business outlook with special reference to the effects of government spending. Three speakers participated: Leonard P. Ayres, of the Cleveland Trust Company, Corrington Gill, of the Works Progress Administration, and Courtland Elliott, of A. E. Ames and Company.

Retail and wholesale trade was the subject of the third session. H. Marshall, of the Dominion Bureau of Statistics, discussed the methods and some of the results of the Canadian Census of Merchandising and Service Establishments and the Annual Survey of Retail Trade. The patterns of wholesale and retail trade in Canada and the United States were compared by Vergil Reed, of the U. S. Census Bureau. Willard Thorp, of Dun and Bradstreet, discussed the need for adequate statistics of inventories and business credit and by way of illustration presented a number of points on which current conceptions are at variance with the facts reported in recent studies.

The American Statistical Association joined with the Canadian Agricultural Economics Society and the Canadian Society of Technical Agriculturalists in a session on weather and crop yields. A survey of crop-weather research in the United States was presented by C. F. Sarle, of the Bureau of Agricultural Economics. The relationship between weather factors and wheat yields was discussed with respect to western Kansas by George Montgomery, of Kansas State College, and with respect to western Canada by C. F. Wilson, of the Dominion Bureau of Statistics.

SECTION ON HISTORICAL AND PHILOLOGICAL SCIENCES (L)

(From report by Joseph Mayer)

With the able assistance of Lawrence J. Burpee, of the International Joint Commission, a program was arranged on which eight Canadian scientists presented papers in a two-session symposium on the "History of Science in Canada" (item 15 under Symposia). H. M. Tory presided at the morning session and Joseph Mayer at the afternoon session. The latter delivered the ninth paper, the closing address, on

"Why the Social Sciences Lag Behind the Biological and Physical Sciences."

The papers of the symposium covered the most important scientific advances in Canada from mathematics through biology, some of the developments being illustrated with appropriate lantern slides. The paper on the progress of mathematics in Canada dealt largely with instructional problems and gave examples of examination questions prepared for present-day students and for those of thirty years ago. The advance of physics in Canada was broadly outlined and pictures of modern laboratories and other university facilities were presented. The beginnings of chemistry in Canada were shown with a delightful humor in the presentation of colorful early episodes in chemical progress. The character and work of the scientists who contributed most to the development of botany and zoology in Canada were outlined in some detail. And the growths of Canadian geology and astronomy were likewise well portrayed. Finally, the character of medical research in Canada during the French régime was described in a most interesting manner, and rare manuscripts and books bearing upon this period were exhibited. It is anticipated that these eight papers of the symposium will be printed in one volume under the editorship of Dr. Tory.

SECTION OF ENGINEERING (M) AND INSTITUTE OF AERONAUTICAL SCIENCES

(From report by Norman Marr)

The Section on Engineering (M) held one session with four papers on widely diverse subjects. About eighty persons attended this session. The first paper dealt with the collapse of the Falls View Bridge at Niagara Falls during extraordinary ice conditions in the Niagara river in January, 1938. The second paper discussed mining, concentration and transportation operations in connection with mining and treating radium-bearing ores on Great Bear Lake in the sub-Arctic region of northern Canada. The third paper described some instrumental aids to mapping from air photographs as practised in Canada. The fourth paper dealt with some aspects of applied science from the viewpoint of an electrical engineer.

Serving for A. A. Potter as chairman of the section was G. J. Desbarats, immediate past-president of the Engineering Institute of Canada, and Norman Marr, chief hydraulic engineer, Dominion Water and Power Bureau, Department of Mines and Resources, Ottawa, acted as secretary.

The program of the Institute of the Aeronautical Sciences consisted of three sessions, at which nine papers were presented. At the first session I. I. Sikorsky read a paper on "Flying Boats"; T. R. London, one on "Photoelastic Stress Methods"; and G. J. Klein, one on "Snow Performance of Aircraft Skis."

The second session consisted of a paper on "Detonation" by C. S. Draper and one on "Aircraft Fuels" by S. D. Heron and of motion pictures of Langley Field with explanatory comments by Lester D. Gardner. The program on aids to flying consisted of the following papers: "The Radiometeorograph," by W. R. Gregg, "Meteorological Services for Trans-Canada Airway," by J. Patterson, and "The Cathode Ray Compass," by J. T. Henderson.

SECTION OF MEDICAL SCIENCES (N) AND SUBSECTION ON PHARMACY

(From report by Malcolm H. Soule)

The section on Medical Sciences joined on Monday with the Sections on Botanical Sciences and Agriculture, the American Phytopathological Society and the Genetics Society of America in a symposium on "The Genetics of Pathogenic Organisms" (item 7 under Symposia). More than eighty persons attended each of the two sessions. On Tuesday a symposium was held by the section on "Bacillus Calmette-Guérin (B.C.G.)" (item 16 under Symposia). Wednesday morning the section combined with the Section on Chemistry (C) in a symposium on "Medical Biochemistry" (item 1 under Symposia).

Two papers dealing with the ultraviruses introduced the first symposium. These invisible agents, which in many instances are of molecular dimensions, are generally accepted as living entities. Those that are well known produce specific diseases such as influenza, yellow fever and rabies in animals and tobacco mosaic in plants. As a matter of fact, disease production is the only index of their existence. All agreed that at present little significance can be attached to the genetics of such tiny forms. However, differences in strains of particular viruses are well recognized and changes may be induced by passage through different hosts. In this connection E. A. Watson stated that the same strain of equine encephalomyelitis virus by serial passage through guinea pigs, mice and chick embryos exhibits three strikingly different degrees of virulence, the chick embryo strains being most potent.

Papers dealing with the protozoa, bacteria and fungi pathogenic to plants followed, with a total of eleven contributions. These larger forms may be seen easily under the microscope, and in most instances they give rise to macroscopic growths when cultured on laboratory mediums. All in attendance agreed that there are many problems of mutual interest and that the symposium was of great value in bringing the group together. It was repeatedly emphasized that the plant diseases are superior for experimental work because of the unlimited numbers that may be employed at any one time, the ease of controlling the hosts and the low costs.

The holding of the second symposium at this time

and in Ottawa was of particular significance. When Calmette first introduced the *Bacillus Calmette-Guérin* (B.C.G.) as a prophylactic measure against tuberculosis in France, over fifteen years ago, there was considerable criticism. This technique utilizes a living attenuated culture of the tubercle bacillus. On many occasions it has been pointed out that the viable germ, though apparently harmless, might regain its virulence without warning, and when fed to the infants for purposes of protection might in reality produce active infections with subsequent death. The Canadian investigators undertook to confirm the experiments of Calmette under carefully controlled conditions. A very thorough and ambitious program was projected under the immediate supervision of the Research Council, and experiments in the field of veterinary medicine were included. The data that have been gathered over a period of thirteen years were presented in six papers. Wm. H. Park, of New York City, in discussing the results drew attention to the fact that the figures did not give unequivocal proof that children or calves injected with B.C.G. were solidly protected against exposure to active tuberculosis. There was general concurrence in the opinion that there is no danger attendant with this method provided the organisms are cultured under the conditions originally described. Dr. Park urged that the Canadian workers continue their experiments, for with the passage of time sufficient data will accumulate to permit of more certain conclusions.

Six papers composed the symposium on "Medical Biochemistry." They were by individuals from the medical research institutions at Toronto and Montreal and dealt with the fundamental problems of some of the hormones, particularly insulin and pituitary extracts, as well as the purification of the anticoagulant heparin. Attention was drawn to the possibility that the continued use of insulin by diabetics might elicit the production of neutralizing antibodies and thus render it inert as a reagent for the control of sugar metabolism. These papers only served to emphasize the outstanding achievements of these workers and their continued productivity in the field of medical research.

SECTION ON AGRICULTURE (O) AND AFFILIATED SOCIETIES

(From reports by Henry Clepper, H. G. Crawford, M. F. Morgan, C. D. MacKenzie, J. M. Armstrong and F. S. Browne)

The Section on Agriculture participated with the Sections on Botanical Sciences and Medical Sciences and with the American Phytopathological Society and the Genetics Society of America in the symposium on "The Genetics of Pathogenic Organisms" (item 7 under Symposia).

The second annual summer meeting of the Society of American Foresters was held jointly with the Canadian Society of Forest Engineers, the Association of Forest Engineers of Quebec and the Woodlands Section of the Canadian Pulp and Paper Association. Approximately 150 members of these related organizations were present.

In general, the problems of forestry and related fields were discussed in four principal parts: (1) sessions of interest mainly to foresters and forest engineers and devoted to forest administration, management, classification, research, surveys, reforestation and flood control and silviculture; (2) a joint session with forest entomologists and forest pathologists; (3) two joint sessions with the Ecological Society of America, one of which was a symposium on "The Influence of Fire on Forests, Wild Life and Public Welfare" (item 13 under Symposia); and (4) a field trip to the Petawawa Forest Experiment Station.

The two-day field trip to the Petawawa Forest Experiment Station afforded an opportunity to observe Canadian forest research in silvicultural practices, thinning and improvement cuttings, plantations, and disease, insect and fire control.

In all, twenty-seven papers, supplemented by prepared discussions, were presented by forest workers. Arrangements were made to publish the complete proceedings of the sessions in the October, 1938, issue of the *Journal of Forestry*.

The Canadian Society of Technical Agriculturists, in cooperation with the Canadian Society of Animal Production and the Canadian Agricultural Economics Society, held ten sessions, of which one was a symposium on "Progress of Swine Improvement in Canada," one a round-table discussion by the Engineering Group and one a joint session with the American Statistical Association on the general subject, "Weather and Crop Yields." At the ten sessions fifty-three papers were presented.

The program of the Horticultural Group consisted of miscellaneous papers on horticulture. During the first day the subject of northern horticulture was dealt with by W. D. Albright and E. T. Goring. This subject proved of unusual interest, for most of those present had little or no conception of the achievements in horticulture along the northern limits of civilization on this continent.

A new method for the evaluation of spray materials for apple trees was presented by C. E. Petch, by which the amount of marketable crop, together with vigor and growth of the tree, is used as the measure rather than actual disease and insect control.

In a progress report on the breeding of potatoes for disease resistance, J. L. Howatt stated that very satisfactory progress has been made at the Dominion

Experimental Station, Fredericton, New Brunswick. A large number of highly resistant seedlings has been obtained from the hybridizing of several species, many of which appeared to possess desirable characters for commercial use.

Other papers were presented on storage investigations of tomatoes and celery, weed control in lawns, rootstock and scion relationship of apple trees, nutrient requirements of peaches, rapid soil tests for tobacco soils and cropping practices for flue-cured tobacco.

At the business session Dr. A. F. Barss, of the University of British Columbia, Vancouver, British Columbia, was elected chairman of the group for the year 1938-39, succeeding Dr. C. F. Patterson, of the University of Saskatchewan, Saskatoon, Saskatchewan.

Two sessions of the Canadian Society of Animal Production (Eastern Section), an affiliated body of the Canadian Society of Technical Agriculturists, were held, the former including business, reports and addresses, while the latter was a symposium on "The Progress of Swine Improvement in Canada" (item 17 under Symposia). At the program of the second session, which included six papers, the policy of the Dominion Department of Agriculture with regard to the Advanced Registration of pure-bred swine was outlined, and the several papers included the results of its operation at different centers, relating to progress in breeding, nutritional, carcass evaluation and market quality studies. The papers presented are expected to appear in *Scientific Agriculture* at an early date. The president and secretary-treasurer elected for the forthcoming year are R. G. Knox, Ontario Agricultural College, Guelph, Ont., and C. D. MacKenzie, Central Experimental Farm, Ottawa, Ont., respectively.

The meeting of the Agricultural Engineering Group provided an opportunity for the discussion of farm power and machinery problems in eastern Canada. Discussion on "Mechanical Problems for the Agricultural Engineer" indicated the desirability of combining certain field operations, the development of machines to meet new needs and more extensive testing of equipment over a wide range of conditions. The topic "Tractors for the 100-acre Farm" was also discussed from the angle of individual ownership, hiring of tractor and available work on small farms.

Prospects for "The Small Combine-Harvester in Eastern Canada" were reviewed in the light of recent developments in these machines and farmers' experience with small combines in Ontario in 1937. Under the title "Drying of Forage Crops" the meeting was given an interesting account of the development of a bin-type drier for hybrid seed corn and its adaptability to tray-drying of grass crops. In a paper on "Agri-

cultural Engineering Services in Canada," attention was called to the fact that the farm demand for assistance of an engineering nature is definitely on the increase. Agricultural engineers were urged to attend first to improvements likely to increase production per man as the surest way to increased farm profits.

The meeting of the American Society of Agronomy, with an attendance of 125, was in the form of a conference relative to the evaluation of comparative nutritive value of pasture herbage, hay and other livestock feed crops. Papers presented by O. S. Aamodt, P. E. Howe and T. E. Woodward all brought out the limitations of present standards of comparative evaluation, both on the basis of total digestible nutrients and calorimetric measurements. F. B. Morrison, in an especially stimulating paper based on his classical studies along this line, presented the concept of *net energy values*. N. J. Thomas discussed the great variations in fattening quality of pasture herbage, irrespective of the quantity of feed produced. He suggested that the lignin content may be much more important than the conventional "crude fiber" expression. E. W. Crampton showed that small "pilot" feeding trials with rabbits may be used to facilitate research in determining the nutritive value of pasture herbage.

Steps were taken toward the formation of a joint committee of various organizations interested in standards of measurement in the determinations of nutritive value of pastures and crops.

The Northeastern Section, American Society of Agronomy, with an attendance of about 40, held a brief business meeting, at which officers were elected and a meeting place for 1939 was discussed. This group visited the Dominion Farms on Thursday afternoon.

SECTION ON EDUCATION (Q)

(From report of J. E. Robbins)

A major share of the time of the sessions of the Section on Education was given to Canadian problems, twenty-six of the thirty-five papers presented being by Canadian authors. The attendance included representatives from all but one of the nine provincial Departments of Education, and from Newfoundland, thus giving to the discussions a thoroughly representative character. This had a special value for the round-tables on elementary and secondary curricula and for a luncheon meeting which explored the question of establishing a Canadian council on research in education, the central purpose of these meetings being an exchange of views among educators from the widely separated parts of the Dominion. Complete curriculum revisions have recently been made, or are in process of being made, in a majority of the provinces and an opportunity for exchange of experience

was welcomed. Reports also of several interesting experiments in curriculum were heard from New York educators.

Dr. H. F. Munro, president of the Canadian Education Association, told the luncheon meeting there was good reason to hope that it would be followed, at the association's biennial meeting in August, by an announcement of the establishment of a Canadian Council for Educational Research, and Mr. C. N. Crutchfield, general secretary of the Canadian Teachers' Federation, pledged the support of the national teachers' organization in the project.

A program on visual education included consideration of the museum as an aid in teaching, as well as the several varieties of projection apparatus that are coming into increasing use in the classroom. A representative of the National Film Society of Canada reported on the society's plans to assist educational authorities, and the Quebec Department of Education gave a demonstration of the use of films, with the assistance of the Associated Screen News of Montreal.

A session on organization and administrative problems in Canadian education included three descriptive papers dealing with Newfoundland, Protestant Quebec and rural Ontario, respectively. A fourth contribution analyzed the relationship of the Dominion Government to education, and a fifth set out a program of teacher-training in the use of visual aids. Two others were statistical studies, one on the sociological consequences of the organization of a large unit of rural administration in Manitoba, and the other summarizing the results of an exhaustive study of data on illiteracy from the decennial census.

Two joint sessions with the Section on Psychology were held, one on child study and pre-school education, the other on vocational selection and tests. The subject-matter of these discussions was less local in character and less concerned with the problems peculiar to Canadian education than in the case of the other sessions, though seven of the thirteen papers were of Canadian origin. Reference to these sessions is also made in the report of the Section on Psychology.

OBITUARY

FRANK LAMSON-SCRIBNER

FRANK LAMSON-SCRIBNER, who died on February 22, was born in Cambridgeport, Massachusetts, on April 19, 1851. From the time of his earliest recollection he loved the "out of doors" and plants and flowers in particular. This love of nature grew as he grew and as he came to mature years dominated his life. His interests in natural history led him into the fields of higher education. After completing high school he entered the University of Maine, graduating with a B.S. in 1873. In 1920 his Alma Mater conferred upon him, for his distinguished service to science and to agriculture, the degree of LL.D. After completing his undergraduate work at the university he took up school teaching in Maine. In 1877 he was called to Girard College, Philadelphia, where he continued his interest in botany and horticulture in what was then the center of interest in those fields in the United States. He remained there and did notable work until 1885, when he came to the U. S. Department of Agriculture as assistant botanist. He received his appointment as the result of a competitive civil service examination. The department had been organized in 1862, but was just beginning to be recognized as a promising scientific institution. The botanical work under Dr. George Vasey was soon enlarged to include plant diseases, and Lamson-Scribner became the first chief of that section. His work in that field 1886-1888 is still recognized as standard and as laying the foundations of the great developments that have followed.

As a result of his fine record he was called to the University of Tennessee as professor of botany and horticulture, 1888-1894. He was director of the Experiment Station from 1890 to 1894.

He was called back to the Department of Agriculture in 1894 as chief of a new division, "Agrostology," for the study of forage plants. He did excellent work in developing this field of agricultural science on a basis of practical value to farmers. In 1901 he was selected as chief of the Insular Bureau of Agriculture of the Philippines, where he remained for four years and built up an excellent organization adapted to handle the intricate problems of the agriculture of those islands. Expressions of appreciation of his great services came from the Philippine Government and people and from those in the United States charged with responsibility at that time. After completion of his work, 1904, in the Philippines he returned to the United States Department of Agriculture as special agent and agrostologist from 1904 to 1922.

It was in the early part of this period that he renewed his interests in exhibit work, which began at the history museum at Carlisle, Pennsylvania, 1927-28. He had general charge of the Lewis and Clark Exposition, 1905; Jamestown Exposition, 1907; Alaska Yukon Exposition, 1909; Buenos Aires Centenary Exposition, 1910; U. S. Department of Agriculture, representative Turin Exposition, 1911; member of the U. S. Government Exposition Board, Pan Pacific Exposition, 1915; director of exhibits, U. S. Depart-

ment of State, Centennial Exposition Rio de Janeiro, 1922-1923; supervisor of U. S. exhibits, Sesquicentennial Exposition, 1926.

His advice and help in organizing the scientific exhibits for agriculture for the Century of Progress Exposition (Chicago, 1933-34) were much appreciated by the writer and by the officers of the exposition.

Dr. Scribner retired from active government service in 1922. He received special honor as Chevalier, Mérite agricole, 1889. He was a member of the New England Botanical Club, Academy of Natural Science, Philadelphia; Buffalo Academy; and was the author of many publications dealing with various aspects of botany and agriculture.

He was an expert photographer and accumulated an invaluable photographic record of the many things of interest with which he came in contact. A recent paper on the Botanic Garden at Rio de Janeiro is illustrated with enlargements of some of these superb photographs. The article is the leading one in the January, 1938, number of *The Scientific Monthly*.

Dr. Lamson-Scribner was "going strong" for more than four score years. He was straight as an arrow, clear of vision and intellect, interested in his work of collecting and writing until the day of his death.

A. F. WOODS

BUREAU OF PLANT INDUSTRY,
U. S. DEPARTMENT OF AGRICULTURE

RECENT DEATHS AND MEMORIALS

DR. ERNEST WILLIAM BROWN, Josiah Willard Gibbs professor of mathematics emeritus at Yale University, died on July 22 at the age of seventy-one years.

DR. JACOB KUNZ, professor of mathematical physics at the University of Illinois, died on July 18 at the age of sixty-four years.

DR. LOUIS K. OPPITZ, professor of physics at McKendree College, Lebanon, Ill., died on July 8 at the age of sixty years.

ARTHUR W. COWLES, who until his retirement last January had been for forty-two years connected with the United States Patent Office, for the last twenty-six years as chief, died on July 21 at the age of seventy-eight years.

A BRONZE plaque in memory of Professor F. B. Peck, formerly head of the department of geology of Lafayette College, was unveiled recently in Markle Hall. The presentation was made by Dr. L. L. Smith, one of Professor Peck's former students, now head of the department of geology at the University of South Carolina. Dr. William S. Hall, emeritus professor of mathematics, read a eulogy, and President Lewis accepted the plaque for the college. The inscription is as follows: "Frederick Burritt Peck, professor of geology, 1897-1925; eminent geologist, inspiring teacher, sympathetic counsellor, exemplary gentleman and lovable character. Erected by his students."

Nature states that the tercentenary celebrations of the birth of James Gregory began at the Royal Society, Edinburgh, on July 4, when papers by Professors H. W. Turnbull, F. Enriques, M. Dehn, E. Hellinger and Dr. O. Prag were presented on his mathematical work. On July 5 a special graduation at the University of St. Andrews was held in the Upper Library Hall, where Gregory had worked and made astronomical observations. Honorary degrees were conferred on Professors G. D. Birkhoff, of Harvard University; A. W. Conway, of University College, Dublin; O. Neugebauer, of the University of Copenhagen; R. Weitzenböck, of the University of Amsterdam, and (*in absentia*) V. Volterra, of the University of Rome. Addresses were received from the Royal Societies of London and Edinburgh, the London Mathematical Society, the Edinburgh Mathematical Society and the Universities of Edinburgh, Cambridge, Paris and from others. An exhibition of books and scientific instruments associated with James Gregory was arranged in the Parliament Hall, Library Buildings, St. Andrews.

SCIENTIFIC EVENTS

UPPER-AIR SOUNDINGS

THE radiometeorograph will replace the airplane in making upper-air soundings at six Weather Bureau stations next month.

At Nashville, Tenn.; Sault Sainte Marie, Mich.; Omaha, Nebr.; Oklahoma City, Okla.; Fargo, N. Dak., and Oakland, Calif., the instrument will be carried aloft each morning by a small balloon inflated with helium. The response of weather-sensitive elements in the observatory end of the instrument to changes in the surrounding atmosphere causes the miniature wire-

less station to send out sound signals. From their audio frequency, these signals, received at a ground station, can be translated into terms of temperature, pressure and humidity of the air at all heights reached by the robot weather observer.

"Regular use of the radiometeorograph," according to Dr. W. R. Gregg, "marks the beginning of a new epoch in meteorological service." Until upper air data became available, forecasts depended mainly on ground observations of the distribution and movement of air masses. This system finally reached its limit

in accuracy. With more upper-air data, obtained by self-recording instruments borne by balloons and airplanes, greater accuracy in forecasting now becomes possible.

The radiometeorograph has several advantages over the airplane as a weather explorer. It can go higher—10 to 20 miles above the earth, which is well up into the stratosphere. It can take off in weather that grounds planes, thus supplying observations at critical times in weather history. It reports its findings instantly, doing away with the hour or longer wait for the return of the recorder. The radiometeorograph, however, does not provide information on the direction or velocity of the wind. New observation technique now being developed in the laboratory will add this information.

Tests at two Weather Bureau stations last year proved the value of the radiometeorograph in making daily upper-air soundings. The essential parts of various models used last year and of the one to be used this year are the same—a unit that responds to atmospheric changes and a radio transmitter that reports the atmospheric changes as sound signals, which are picked up at ground stations of the Weather Bureau. The official announcement reads in part as follows:

The weather-sensitive elements of the new radiometeorograph are several strands of human hair, which tighten or loosen as the air around them becomes drier or more moist, and a small glass tube filled with sulphuric acid which responds to changes in temperature. Last year's radiometeorographs were kept running by a special clockwork. This year's model depends on changes in atmospheric pressure to make it run. The decrease in atmospheric pressure as the instrument rises moves a small switch arm over a series of equally spaced electrical contacts, separated by insulating strips. The contacts are spaced so that a decrease in air pressure equivalent to several hundred feet of elevation makes the switch arm move from a contact to an insulating strip. The next decrease makes it move to the next contact, and so on until the carrier balloon bursts and the radiometeorograph, attached to a small silken parachute to break the fall, drops back to earth. In nine times out of ten, at stations in well-populated regions, it is recovered and returned to the Weather Bureau.

THE NEW LABORATORY OF CHEMICAL ENGINEERING AT THE CASE SCHOOL OF APPLIED SCIENCE

THE Board of Trustees of Case School of Applied Science has authorized the immediate construction of the first unit of a new laboratory of chemical engineering, which when completed will cost approximately \$750,000. The first unit will comprise about 40 per cent. of the ultimate structure and will cost upwards of \$300,000. Construction will be started

this summer and the schedule calls for completion in advance of the second semester of the college year.

The building is to be of brick and steel construction. The main portion is to be 64 by 100 feet and four stories in height, with a two-story extension 45 by 55 feet to house large pieces of equipment and to provide special protection against risks of fire or explosion. The first unit will be at the southeast side of the campus adjoining the present electrical building in space now used as a parking area. Later extensions are to occupy the site of the latter building, which it is hoped to replace by a modern laboratory on the southwest front of the campus. Until the final unit of this building can be erected, the present chemical laboratory will be kept in service. Dr. Carl F. Prutton, head of the department of chemical engineering, made an extensive survey of college and industrial laboratories before deciding on plans for the new building. He will have charge of the selection and arrangement of its special equipment.

The unit to be constructed at the present time will provide principally for the distinctly engineering features of the department. The basement will include a large industrial process laboratory 80 by 40 feet, additional grinding, drying and research laboratories, an instrument room, and maintenance and repair shop. The extension will have 35 feet of headroom with a balcony at the 17-foot level covering about half the area. Special booths of reinforced concrete will be provided for experiments involving inflammable, explosive or high pressure reactions.

The first floor of the main structure will have a large senior laboratory of 45 by 85 feet where plant development problems and thesis projects will be handled. This laboratory will provide for sixty-four men at the beginning and provision is made to expand its capacity to eighty. A complete shop will be provided where students may construct their own apparatus. A furnace room for heat reaction experiments, a precision weighing room, research rooms and offices will also be on this floor. The two upper floors will provide an organic laboratory 60 by 45 feet with an ultimate capacity of ninety-six students, a fuel laboratory 60 by 20 feet, a laboratory of physical chemistry, recitation rooms, offices and research laboratories. Distilled water apparatus and ventilating equipment will be placed in a penthouse on the roof. Contaminated air from the laboratories will be completely renewed every four minutes. Unit steam heaters will be employed during the winter months.

THE FIFTH INTERNATIONAL CONGRESS FOR APPLIED MECHANICS

THE fifth International Congress for Applied Mechanics, which is held every four years, will meet at

the Massachusetts Institute of Technology from September 12 to 16, under the presidency of Dr. Karl T. Compton, president of the institute. An attendance of three hundred members is expected. The last session of the congress was held in 1934 at the University of Cambridge.

Much of the work of the congress will be conducted at various technical sessions, at which international leaders in the field will present reports on their latest research and participate in informal discussions with other delegates. There will also be several general lectures designed to give a comprehensive rather than specialized view of the major problems of applied mechanics. The official languages of the congress are English, French and German.

To facilitate the presentation of technical papers the field of applied mechanics has been divided into three sections. One will deal with structures, elasticity, plasticity, fatigue, strength theory and crystal structure. A second section will concern hydro and aerodynamics, gas dynamics, hydraulics, meteorology, waterwaves and heat transfer. The third division will focus attention on the dynamics of solids, vibration and sound, friction and lubrication and wear and seizure.

The new Wright Brothers Memorial Wind Tunnel for aeronautical research at the Massachusetts Institute of Technology will be dedicated and numerous other exhibits of engineering equipment and demonstrations of research apparatus are being arranged. At the close of the congress delegates from foreign countries will be given the opportunity to visit the research centers of the East. These will include a trip to Washington to visit government laboratories, one to the Langley Memorial Laboratory of the National Advisory Committee for Aeronautics at Langley Field, Virginia, and others to the large industrial plants and research laboratories of Pittsburgh, Detroit, Niagara Falls and Schenectady.

Among those expected to participate are:

Professor K. Federhofer, of the Graz Technical School, Austria; Professor L. Baes, of the University of Brussels; Professor K. Popoff, of Sofia, Bulgaria; Professor K. Koerner, of the Prague Technical School, Czechoslovakia; Professor V. Bjerknes, of the University of Oslo; Professor E. Nicolai, of the Polytechnical Institute, Leningrad, and Professor H. U. Sverdrup, of the University of Bergen.

From England: Professor L. Bairstow, of the Imperial College, London; Professor R. V. Southwell, of the University of Oxford, and Professor G. I. Taylor, of the University of Cambridge.

From France: Professor E. Hahn, of the University of Nancy, and Professor E. Jouguet, Professor J. Pères and Professor P. Villat, of the University of Paris.

From Germany: Professor R. Grammel, of the Stutt-

gart Technical School; Professor L. Prandtl, of the Kaiser Wilhelm Institute, Göttingen; Professor F. Koerber, of the Kaiser Wilhelm Institute, Dusseldorf, and Professor E. Trefftz, of the Dresden Technical School.

From Italy: Professor C. Guido, of Torino, and Professor Tullio Levi-Civita, of the University of Rome.

From Holland: Professor C. B. Biezeno and Professor J. M. Burgers, both of the Delft Technical School, and Professor E. B. Wolff, of the University of Amsterdam.

Professor Jerome C. Hunsaker, head of the department of mechanical engineering of the Massachusetts Institute of Technology, is secretary of the congress. Dean H. M. Westergaard, of the Harvard Graduate School of Engineering, is chairman of the committee in charge of the arrangements for the meeting.

THE INFANTILE PARALYSIS FOUNDATION

THE following account is given of the Infantile Paralysis Foundation in the *Journal* of the American Medical Association:

Basil O'Connor, New York, president of the National Foundation for Infantile Paralysis, in a letter addressed to President Roosevelt on June 21 announced the appointment of a general advisory committee and four subcommittees to advise the foundation on the allotment of its funds. At that time Keith Morgan, New York, chairman of the Committee for Celebration of the President's Birthday, presented to the President a check for \$1,010,000 as the principal instalment of the funds raised in the 1938 celebrations. It is expected that about \$50,000 more will be added when the auditor's report is completed. The general committee has the following members:

Dr. Irvin Abell, Louisville, Ky., president of the American Medical Association.

Dr. Philip Lewin, associate professor of orthopedic surgery, Northwestern University Medical School, Chicago.

Dr. Thomas Parran, surgeon-general, U. S. Public Health Service, Washington, D. C.

Dr. Max Minor Peet, professor of surgery of the University of Michigan Medical School.

Dr. Thomas M. Rivers, director of the Hospital of the Rockefeller Institute for Medical Research, New York.

Dr. Rivers is chairman of the subcommittee on scientific research, of which the members are: Dr. Donald B. Armstrong, Metropolitan Life Insurance Company, New York; Dr. George W. McCoy, U. S. Public Health Service, Washington, D. C., and Dr. Karl F. Meyer, Hooper Foundation, University of California, San Francisco. Dr. Parran heads a committee on public health which will give aid in time of epidemics; members are: Drs. Don W. Gudakunst, state health officer of Michigan, Lansing, and George H. Ramsey, health commissioner of Westchester County, White Plains, N. Y. Dr. Peet is chairman of a committee on

education, with Dr. Abell and Dr. Morris Fishbein, editor of the *Journal* of the American Medical Association, Chicago, as the other members. Dr. Lewin is chairman of a committee on treatment of after-effects; other members are: Drs. George E. Bennett, associate professor of orthopedic surgery, the Johns Hopkins University School of Medicine, Baltimore; Charles Le Roy Lowman, Los Angeles Orthopedic Hospital, Los Angeles; Leo Mayer, associate professor of clinical orthopedic surgery, Columbia University New York Post-Graduate Medical School, New York, and Frank R. Ober, assistant dean and clinical professor

of orthopedic surgery, Harvard University Medical School, Boston. The foundation has adopted the policy of assisting in study and research on the medical problem as a whole and not of giving individual care for those afflicted. It is felt that the problem of locating crippled children and providing medical, surgical, corrective and other services and care and facilities for diagnosis, hospitalization and after-care of the individual case is essentially a local problem and that the foundation must confine itself to aiding institutions and centers in which methods or procedures may be developed which will be of benefit to all the afflicted.

SCIENTIFIC NOTES AND NEWS

At the opening ceremony of the fifteenth International Geographical Congress at Amsterdam on July 18, honorary memberships in the Royal Dutch Geographical Society were conferred on Dr. Elmer Drew Merrill, professor of botany and administrator of the botanical collections of Harvard University, in recognition of his work in botanical geography, and on Professor Carl Ortwin Sauer, professor of geography and chairman of the department, at the University of California, in recognition of his work in physical and social geography.

A TESTIMONIAL dinner was recently given by alumni of the University of Michigan to Dr. James W. Glover, James Olney professor of mathematics and chairman of the department, who retired from active teaching at the end of the academic year. In his honor the James W. Glover scholarship fund, made possible by contributions from his former students, was announced, and a check for \$800, as the nucleus of this fund, was presented to the university and was received by Vice-President Shirley W. Smith. There was also presented a volume containing many voluntary letters received by the committee, expressing admiration and affection for Dr. Glover.

DR. A. W. HOMBERGER, professor of chemistry and head of the department at the University of Louisville, was given at the close of the academic year a testimonial dinner sponsored by the Chemistry Club Alumni Association, in recognition of his twenty years' service to the university. The dinner was participated in by about one hundred and fifty of his colleagues, former students and friends. Dr. A. J. Miller, head of the department of pathology of the School of Medicine, acted as master of ceremonies. A silver tray with the insignia "H₂O" engraved on it was presented to Dr. Homberger in token of appreciation by the Alumni Chemistry Club.

Nature writes: "Among the distinguished scientific men of science who have left Vienna since the An-

schluss is Professor Sigmund Freud, who has taken refuge in London. Professor Freud celebrated his eighty-second birthday on May 6 last. His name will always be associated with the development of psychoanalysis, and the significance of his contributions to psychology was acknowledged by his election in 1936 to foreign membership of the Royal Society, but Professor Freud had not hitherto been able to sign the roll of membership. Although now resident in London, Professor Freud was prevented by infirmity from attending the society's rooms for this purpose, and although the charter book is rarely removed from Burlington House except when it is taken to Buckingham Palace for the signature of the King as patron of the Society, it was decided to extend the privilege to Professor Freud. Accordingly, on June 23, Sir Albert Seward, foreign secretary, and Professor A. V. Hill, one of the secretaries, accompanied J. D. Griffith Davies, who as assistant secretary has custody of the charter book, to Professor Freud's residence, where the roll was duly signed by Professor Freud in the presence of his daughter, Dr. Anna Freud, and Princess Marie of Greece, who was a pupil of his and received him when he left Austria. On behalf of the Royal Society, Sir Albert Seward presented to Professor Freud an inscribed copy of a facsimile of the society's charter book."

Two Rivers Memorial Medals for 1938 of the Royal Anthropological Institute, London, were presented at the recent annual meeting of the society to Professor A. R. Radcliffe Brown, for anthropological research in the Andaman Islands and Australia, and to Miss Dorothy Annie Elizabeth Garrod, for work in Gibraltar, Southern Kurdistan and Palestine. The Wellcome Gold Medal for 1937 for anthropological research was awarded to Dr. Meyer Fortes for a study of the "Marriage Law among the Tallensi."

At the annual commemoration ceremony on May 14, the third Farrer Memorial Medal was presented to Dr.

W. L. Waterhouse, acting dean of the faculty of agriculture of the University of Sydney.

THE degree of doctor of science has been conferred by Washington University on Oakes Ames, research professor of botany and director of the Botanical Museum, Harvard University. The citation made by Dr. George T. Moore, director of the Henry Shaw School of Botany, follows: "He calls the orchids by name in order that others may likewise know them. Final authority, whose published works, illumined by the accurate, artistic skill of Blanche Ames, his wife, are at once the admiration and envy of the botanical world."

THE doctorate of engineering was conferred by the University of Michigan at commencement on Dr. Stephen Timoshenko, formerly professor of mechanical engineering, who was recently called to Stanford University.

WESLEY P. SYKES, research metallurgist at the Cleveland Wire Works of the General Electric Company, was awarded the honorary degree of doctor of engineering at the fifty-fourth annual commencement exercises of the Case School of Applied Science.

COLONEL CHARLES FRANKLIN CRAIG, Medical Corps, U. S. Army, retired, will retire as professor of tropical medicine and head of the department at the Medical School of Tulane University of Louisiana on September 1. He has been appointed emeritus professor of tropical medicine.

DR. RALPH E. CLELAND, professor of biology at Goucher College, has been appointed head of the department of botany at Indiana University.

DR. WILLIAM M. HALE, assistant professor at the Yale University School of Medicine, has been appointed professor and head of the department of bacteriology of the College of Medicine of the State University of Iowa.

DR. WILLIAM LINDSAY MALCOLM, professor of municipal engineering in Queens University, Canada, has been appointed director of the School of Civil Engineering in the College of Engineering of Cornell University.

AT Lehigh University, Professor Hale Sutherland, head of the department of civil engineering, has been appointed director of the Fritz Laboratory. Dr. Bruce Gilbert Johnston, of Columbia University, has been appointed assistant professor of civil engineering and assistant director of the laboratory. He succeeds Dr. Inge Lyse, who resigned recently to accept a professorship in the Institute of Technology of Norway.

AT Northwestern University, John Fyfe Calvert

has been appointed professor of electrical engineering; L. T. Wyly, assistant professor of civil engineering, and Paul D. Parker, assistant professor of mechanical engineering. The appointments are part of the enlarged teaching and research program for the School of Engineering which has been developed in cooperation with the Engineers' Council for Professional Development.

DR. WILLARD Z. PARK, of the department of anthropology of Northwestern University, has been made head of the combined departments of sociology and anthropology at the University of Oklahoma; Dr. Donald B. McMullen, formerly head of the department of biology at Monmouth College, has been appointed assistant professor of bacteriology, in charge of the division of parasitology at the Medical School.

THE J. T. Baker Chemical Company research fellowship in analytical chemistry, Eastern Division, has been awarded for the academic year 1938-1939 to C. J. Barton, who will work at the University of Virginia under the direction of Professor J. H. Yoe in the field of photoelectric colorimetry. Members of the committee making the award are: Professors G. P. Baxter (Harvard), H. A. Fales (Columbia), C. W. Mason (Cornell), J. H. Yoe (Virginia), and N. H. Furman (Princeton), *chairman*.

DR. ALEXANDER R. TODD, of the Lister Institute of Preventive Medicine, London, has been appointed to succeed Dr. I. M. Heilbron as Sir Samuel Hall professor of chemistry and director of the Chemical Laboratories of the University of Manchester.

DR. STANLEY PATRICK DAVIDSON, Regius professor of medicine in the University of Aberdeen, has been appointed to the chair of medicine at the University of Edinburgh in succession to Professor W. T. Ritchie.

GRANTS have been made by the Committee on Scientific Research of the American Medical Association as follows: To the medical department of the School of Medicine and Dentistry of the University of Rochester for work dealing with agranulocytosis in the cat to be carried out under the direction of Dr. John S. Lawrence; to Dr. Roe E. Remington, professor of chemistry and director of the Food Research Laboratory of the South Carolina Food Research Commission, for work on iodine metabolism in the rat; to Dr. Joseph H. Roe, professor of biochemistry in the School of Medicine of the George Washington University, for work upon the specificity of methods for the determination of ascorbic acid in plant, animal and tumor tissues; to Dr. Louis N. Katz, director of cardiovascular research, the Michael Reese Hospital, Chicago, for studying factors influencing the activities of the heart to be carried out in the isolated heart prep-

aration; to Dr. Maurice Barnes Woodhall, Duke Hospital, Durham, N. C., for a further study of the reaction of central nervous system tissue to transplanted rabbit papilloma, and to Dr. Charles W. Turner, professor of dairy husbandry at the University of Missouri, for work on the relation of thyrotropic hormone of the anterior pituitary to pregnancy and lactation.

DR. HUGH S. CUMMING, formerly surgeon general of the U. S. Public Health Service, has returned to the United States. He attended a meeting of the Committee of the National Health Office in Paris on April 9 and a meeting in Geneva on June 30 of the League of Nations Health Office.

DR. HENRY TEUSCHER, superintendent and chief horticulturist of the Botanical Garden of Montreal, has left to visit the botanical gardens and the main horticultural centers of Europe. He will study the construction of large greenhouses in view of the plans for the greenhouses to be constructed next winter at the Montreal Botanical Garden. The work at the garden is progressing actively. About two hundred and fifty acres are now in course of development.

THE Society of American Bacteriologists will hold its fortieth general meeting on August 30, 31 and September 1, in San Francisco, Calif., at the Hotel Fairmont, under the presidency of Dr. Paul F. Clark, of the University of Wisconsin. The program includes groups of papers in the fields of general, medical, agricultural and industrial bacteriology. Symposia have been arranged on the subjects of nitrogen-fixation, metabolism, filterable viruses and immunity. A joint meeting of all the sections of the society will consider the subject of enzymes in relation to bacteriology. Round-table discussions on the following topics will be held: staphylococci, spirochetes and spirochetal diseases, non-symbiotic nitrogen-fixation and the cross-inoculation of leguminous plants.

THE Massachusetts Institute of Technology announces a conference to be held on September 8 and 9, under the direction of the department of mathematics and the department of economics and social science, on the application of statistical methods to industrial

and engineering problems. Addresses and discussions will include a résumé of certain statistical technique needed for effective handling of industrial data, successful applications of statistical methods in the fields of engineering and quality control, contemporary developments in industrial and engineering statistics. Among those who will address the conference are L. H. C. Tippett, of the British Cotton Industry Research Association; Dr. Walter A. Shewhart, of the Bell Telephone Laboratories; and Dr. S. S. Wilks, professor of statistics at Princeton University. The evening of September 9 will be devoted to applications of statistical methods in the fields of biology and medicine. All correspondence should be addressed to the Secretary, Conference on Engineering and Industrial Statistics, Massachusetts Institute of Technology, Cambridge, Massachusetts.

THE International Congress on Rheumatism will meet in New York in June, 1940. Dr. Ralph Pemberton, of Philadelphia, is president. Subjects to be discussed will be the role of infection in rheumatic diseases, nutrition in rheumatism and the social significance of orthopedic work in rheumatic diseases. A symposium on therapy in rheumatism will be arranged.

THE Sheffield Scientific School of Yale University has received bequests amounting to more than a million dollars. They are a residue interest in the estate of Frederick W. Vanderbilt, '76, of New York City, and \$664,749 from the estate of Miss Marie Oakes Hotchkiss, of East River, Conn.

LORD NUFFIELD has offered to give £60,000 to the University of Birmingham for the extension of the department of physics. Of this a sum of £40,000 is to be used for the building, the remainder being reserved for equipment and maintenance and for the foundation of a research scholarship. The plans for the new block provide for a professor's room and secretary's office, a staff room and library. The central part is a research hall for high-voltage work, this being flanked by eight research rooms, each about 16 feet by 14 feet. There are to be also a machine-room and workshop, two dark rooms and a basement room for high-energy x-ray work.

DISCUSSION

CHEMICAL CONTROL OF STARFISH¹

THE common starfish, *Asterias forbesi*, is the most destructive enemy of the oyster along the North Atlantic Coast. Efforts have been made to eradicate it for at least a century, but these attempts have been largely unavailing. The method in present use by

oystermen consists in gathering the starfish from the bottom by the use of dredges and special starfish mops and destroying the captured animals by immersion in hot water. This method is slow, however, and the unabated depredations of starfish on the oyster beds attest its inefficiency.

Experiments looking toward the development of a method of chemical control have been carried on by

¹ Published with permission of the U. S. Bureau of Fisheries.

the U. S. Bureau of Fisheries for several years. In early experiments substances such as copper sulfate were used. Although this substance proved lethal to starfish, several disadvantages attended its use. Because of its great solubility large quantities were needed to create a concentration lethal to starfish, a procedure too expensive to be of practical value. A further disadvantage was the fact that many marine organisms besides starfish were killed by the chemical.

Since 1937 experiments on the destruction of starfish by the use of calcium oxide or quicklime have been carried out by the senior author at the Milford Laboratory. The possibility of using calcium oxide for combatting starfish was first suggested by Wood.² Recently this substance has been used by the oystermen on grounds located in Long Island Sound.

Under laboratory conditions calcium oxide in powder form proved to be more effective than coarser grades because it covered the bottom more evenly. All starfish in the outside experimental tanks died within 5 to 10 days after being treated with powdered calcium oxide. The chemical was applied at the rate of 300 pounds of powdered substance per acre of bottom.

In the spring of 1938 the experiments were transferred to the oyster beds of Long Island Sound where starfish are abundant. Both powdered and coarse grades of lime were used, the latter having been found to retain its effectiveness longer than the fine. The efficiency of the method on the natural oyster bottoms depends wholly upon the uniform distribution of calcium oxide particles over the treated area and upon the quantity of the chemical used. On 25 acres of starfish-infested oyster bottom treated with calcium oxide at the rate of 480 pounds per acre as many as 80 per cent. of the starfish were found to be affected by the chemical one week after the beginning of the experiment.

The destructive effect of calcium oxide upon starfish is produced by direct contact. Particles of the chemical quickly sink to the bottom, and, falling on the aboral surface of the starfish, imbed themselves in the ciliated epithelium covering the animal. Caustic action of the slaking chemical rapidly disintegrates the delicate skin membrane. The lesions rapidly increase in size, spreading in all directions and involving the branchiae and other surface structures. After several days the lesions penetrate the body wall and the internal organs become exposed. Death usually follows in a short time.

Once spread on the bottom, the chemical retains its effectiveness for some time. Starfish which are not directly hit by the falling particles when the chemical

is applied eventually come in contact with it by crawling on the bottom. In the course of time the lower or oral surfaces of the starfish become affected and disintegration begins.

It has been observed that starfish with large lesions are usually attacked by other starfish and crabs which quickly kill and eat them.

The advantages of calcium oxide as a practical weapon against starfish are many. Of special importance is the fact that it does not appear to be very injurious to many other forms of marine life. No mortality has been observed among other bottom forms such as oysters, clams, several varieties of crabs, barnacles or adult flounders. Many of these animals were kept for as long as three months without apparent effect in large experimental tanks to which the chemical had been added. Studies on the effect of calcium oxide on plankton are now in progress.

Being at once effective and easy to apply, the new method is considered especially suitable for practical use. It should be of particular value in exterminating starfish on public or abandoned oyster bottoms, which, as shown by Loosanoff,³ are the centers of propagation and dispersal of starfish in Long Island Sound.

VICTOR L. LOOSANOFF

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PREPARATION OF L-GLYCERIC ALDEHYDE

We have prepared l-glyceric aldehyde in the following way:¹ l-arabinose \rightarrow l-mannonolactone \rightarrow l-mannitol \rightarrow 1,2-5,6-diacetone-l-mannitol \rightarrow acetone-l-glyceric aldehyde \rightarrow l-glyceric aldehyde (2,4-dinitrophenylhydrazone m.p. 148°, dimedone compound m.p. 198-200°, $[\alpha]_D^{21} = -198^\circ$ in alcohol).

The optical rotations of the l- and d-glyceric aldehyde decrease after some time in aqueous solution from -14° to -7° and from $+14^\circ$ to $+7^\circ$, respectively. However, the aldehyde content of the solution remains unchanged. By evaporating the aqueous solution to dryness, the higher-rotating forms of both aldehydes can be regained. Thus we have a kind of "mutarotation," but no racemization. This point seems to be important because of its biological consequences.

A complete report will be published elsewhere.

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³ V. L. Loosanoff, *Rept. State of Conn. Shellfish Comm.*, 10-14, 1936.

¹ Preparation of d-glyceraldehyde, cf. H. O. L. Fischer and E. Baer, *Helv.*, 19, 524, 1936.

² B. F. Wood, *Rept. State of Conn. Shellfish Comm.*, 94-98, 1908.

DIRECTION OF SOLUTION FLOW AND THE FORMATION OF MINERALS

IN a moving solution the field of environment and any resulting chemical activity are asymmetric with respect to a plane normal to solution movement. Crystal products formed in the laboratory in a moving stream of solution display a number of features peculiar to each end of the polar axis of flow. Mineral and ore specimens show similar asymmetric features which may be recognized in one mineral species and also by the relations between two or more species. The idea is also extended to larger scale geological

bodies where the same principle of asymmetric development of mineral bodies (ore deposits) should obtain.

The problems differ in open space fillings and replacements, but the principles of asymmetric development, linearity, linear distortion and stoss and lee effect are common to both. Investigation is continuing in the interrelation of these features and the structural relations of both open space fillings and replacement deposits.

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SCIENTIFIC BOOKS

SCIENCE IN THE SOUTH

Scientific Interests in the Old South. By THOMAS CARY JOHNSON, JR. viii+217 p. New York and London: D. Appleton-Century Co., Inc., For the Institute for Research in the Social Sciences, University of Virginia. 1936. Price \$2.50.

THIS is a source book of details derived from an extensive and exhaustive review of available sources, books, periodicals, newspapers, catalogues and ephemeral publications of universities, colleges, academies, seminaries, museums and other educational enterprises south of the Mason and Dixon line prior to the Civil War. The author's theme is the refutation of the summary indictment by Morrison in "The Oxford History of the United States," volume 2, page 15, of the "non-existent intellectual life" of the South, due to the cultivation of cotton, the neglect of men and the blight of human slavery. The data assembled tend to support his defence, for they display a wide-spread and active interest in the physical, chemical and medical fields, and a considerable though desultory activity in the natural sciences. An outstanding center of scientific activity was Transylvania College, with its impressive catalogue of scientific apparatus and book bills listing a very complete collection of early nineteenth century memoirs. "It passed its zenith in 1826." Charleston was another brilliant center of scientific interest. Here the Elliott Society of Natural History started off in its *Proceedings* (1859) with a fine display of productivity only to be snuffed out by the war. New Orleans, with its considerable infusion of French blood at a period of intellectual activity in Paris, also became noted for its interest in scientific matters.

The arrangement of the material does not facilitate consultation from a scientific approach except by way of the index. The subject-matter is grouped under such headings as "in college halls, among the people, sweet Southern girls, the glory that was Charleston,

the glamour of New Orleans, and scattered scientists."

This aroma of a social and historical approach to the subject pervades all the chapters. Details of evidence of educational interest abound, but a synthesis of accomplishment in the several disciplines of the sciences is not achieved. There is a noticeable absence of evidence of sustained scientific activity by productive investigators in scientific fields. The publications cited at considerable length from De Bow's *Review* (New Orleans, 1846-1880) are mainly of a general or popular nature, or are reviews of publications elsewhere. The *Southern Review* (Charleston, 1828-1832), the *Southern Quarterly Review* (New Orleans, Charleston and Columbia, S. C., 1842-1856), and the *Literary Messenger* (Richmond, 1834-1864) all contained some scientific articles of this general character indicating a wide-spread interest in science, but there is nothing in the South comparable to the American Philosophical Society of Philadelphia, the Linnaean Society of New York or the American Academy of Arts and Sciences of Boston. The early interest of the South in these organizations fell off in later years, and no local academies of significance were originated locally in the South.

The author cites with just pride the scientific eminence of Dr. William Charles Wells, of Charleston, South Carolina. This pioneer is cited for his anticipation of the theory of natural selection. Wells undoubtedly owed much to Dr. Alexander Garden, his Charleston mentor and correspondent of the Royal Society of London. He also utilized his medical knowledge of tuberculosis and malaria gained in native Carolina as data for his concept of natural selection operating differentially upon white and Negro races of man. But Wells was educated in Edinburgh, and was driven out of the States because of his vigorous loyalist sympathies. Later he was a member of the medical faculty in London and a member of a coterie of leading intellectuals, including the Hunters, Baillie and others. He

was a member of the Royal Society of London, and all his scientific work was done and published there. The author cites the sixth edition (1873) of the "Origin of Species" as the place of acknowledgment by Darwin of the priority of Wells's publication of the concept of natural selection, whereas Darwin first published this in the fourth edition (1866, p. xiv). Wells was not only a pioneer in evolution and physics (of dew) but

also in ophthalmology (theory of vision) and epidemiology.

Scientists are peculiarly subject to environmental influences. Their best work has been done under the aegis of intellectual freedom. Wells spent his energies in Carolina in political turmoil. Fortunately, science knows no race, nationality nor region.

CHARLES A. KOFOID

SPECIAL ARTICLES

YELLOW FEVER VIRUS IN JUNGLE MOSQUITOES¹

UNTIL recent years yellow fever was regarded as a house disease, transmitted solely by the domestic mosquito, *Aedes (Stegomyia) aegypti* (Linnaeus). The existence of a special epidemiological type of the disease, now known as jungle yellow fever, became evident when it broke out under rural and jungle conditions in the Valle do Chanaan, Espirito Santo, Brazil, in 1932. During the course of the epidemic no trace of the classical vector could be found in the infected area.²

Since then over 20 similar outbreaks have been observed in various parts of South America (Colombia, Peru, Bolivia, Paraguay and most of the Brazilian states.)³ Study has shown that during such outbreaks man is generally infected only while in contact with the forest or jungle. Household infections are not common, except where the house stands within the jungle.

It has been shown experimentally that a number of Brazilian mosquitoes other than *Aedes aegypti* can become infected under laboratory conditions. Successful transmission by bite, however, has been obtained only with three species: *Aedes scapularis* (Rondani), *Aedes fluviatilis* (Lutz) and *Haemagogus capricorni* (Lutz).^{4,5,6,7,8}

The 1938 outbreak of jungle yellow fever in the state of Rio de Janeiro, Brazil, afforded an opportunity to

demonstrate the presence of yellow fever virus in mosquitoes caught in the jungle. Mosquitoes collected alive at points near where human infection had occurred were forwarded daily to the laboratory in Rio de Janeiro. They were first classified by species or groups of species and then allowed to bite non-immune rhesus monkeys.⁹ After feeding on the monkeys the insects were tested for the presence of yellow fever virus by a method previously described¹¹ but briefly summarized as follows: They were killed, ground finely, suspended in a diluent and centrifuged, and the supernatant fluid was injected into mice intracerebrally. This report is based on results obtained with 24,304 mosquitoes sent in from the state of Rio de Janeiro over a period of eleven weeks, the following species being represented:

LIST OF WILD-CAUGHT MOSQUITOES TESTED FOR THE PRESENCE OF YELLOW FEVER VIRUS

Group	Species	Used	Fed	Remarks
1	<i>Aedes scapularis</i> (Rondani)	180	100	
2	<i>A. leucocelaenus</i> (Dyar and Shannon)	4,671	2,270	Positive by bite
3	<i>Haemagogus capricorni</i> (Lutz)	1,216	646	Positive by bite
4	<i>Psorophora ferox</i>	253	143	
	<i>P. albipes</i>	15	7	
	<i>A. fulvus</i> (Wiedemann)	8	5	
	<i>A. serratus</i> (Theobald)	1,570	545	
	<i>A. terreus</i> (Walker)	503	58	
5	<i>Sabethes</i> , 3 species	1,092	369	
6	All other sabethines (<i>Sabethoides</i> , <i>Limatus</i> , <i>Wyeomyia</i> , <i>Goeldia</i> and <i>Trichoprosopon</i> (Joblotia), totalling about 20 species	14,796	3,443	Positive by injection

Positive results were obtained from the following:

(1) *Aedes leucocelaenus* (D. and S.). On February 22, Monkey 5, on which a total of 16 *A. leucocelaenus*

⁹ The methods used for collecting, shipping, classifying and feeding will be dealt with in a subsequent paper.¹⁰

¹⁰ R. C. Shannon, "Methods for Collecting and Feeding Mosquitoes in Jungle Yellow Fever Studies." In preparation.

¹¹ L. Whitman, *Jour. Exp. Med.*, 66: 133-143, 1937.

¹ From the Cooperative Yellow Fever Service of the Ministry of Education and Health of Brazil and the International Health Division of The Rockefeller Foundation, Rio de Janeiro.

² F. L. Soper, H. A. Penna, E. Cardoso, J. Serafim, Jr., M. Frobisher, Jr., and J. Pinheiro, *Am. Jour. Hyg.*, 18: 555-587, 1933.

³ F. L. Soper, *Quart. Bull. Health Org., League of Nations*, 5: 1-50, 1936.

⁴ We are indebted to Dr. P. C. A. Antunes for the recent information that *Haemagogus janthinomys* (Dyar) 1921 is a homonym of *H. capricorni* (Lutz) 1904.

⁵ N. C. Davis and R. C. Shannon, *Jour. Expt. Med.*, 1: 803-808, 1929.

⁶ N. C. Davis and R. C. Shannon, *Am. Jour. Trop. Med.*, 11: 21-29, 1931.

⁷ L. Whitman and P. C. A. Antunes, *Am. Jour. Trop. Med.*, 17: 803-823, 1937.

⁸ L. Whitman and P. C. A. Antunes, *Am. Jour. Trop. Med.*, 17: 825-831, 1937.

from Affonso Arinhos had fed on February 7, 9, 10, 11 and 14, was found prostrate in its cage with a subnormal temperature and was sacrificed. This animal showed fever on the 17th, 18th, 19th and 21st, but was not bled because of its previous irregular temperature. Microscopic examination of the liver showed typical lesions of yellow fever, including inclusion bodies, and the blood drawn on the day of death gave positive mouse-protection test results. While it was impossible to fix the date of infection of Monkey 5, experience with other animals suggested that infection probably occurred on the 14th, when only one specimen of *A. leucocelaenus* fed.

(2) *Haemagogus capricorni* (Lutz). Between February 7 and 11, six *H. capricorni*, also collected at Affonso Arinhos, were allowed to feed upon Monkey 4. Between February 24 and 26, twelve additional insects of the same species, collected near Bemposta and Pedro do Rio, were allowed to bite the same animal. The monkey first showed fever on February 28 and died three days later. Autopsy findings followed by microscopic examination of the liver indicated that the animal died of yellow fever. Blood drawn on the first day of fever caused typical yellow fever encephalitis in mice. Blood drawn shortly before death produced fatal encephalitis in one of six mice, and also gave positive mouse-protection test results.

It is believed that Monkey 4 became infected from a lot of four mosquitoes which fed on it on February 24. An emulsion of these mosquitoes injected into mice caused typical yellow fever encephalitis. Monkey 3 was inoculated with second-passage mouse-brain material, with the result that virus was demonstrated in the blood stream and specific yellow fever antibodies were afterward found to be present in the serum.

The supernatant fluid from an emulsion of 118 *H. capricorni*, collected in the same infected areas of Bemposta and Pedro do Rio on March 10, produced encephalitis in mice. Transfer of infective brain material resulted in infection of Monkey 6, with demonstrable circulating virus, and the production of specific immunity as shown by the mouse-protection test. Fifty-eight of the mosquitoes included in this emulsion had fed on Monkey 8 without infecting it.

(3) *Sabethine Mosquitoes*. Owing to the numerous species in the sabethine group and the difficulty of naked-eye classification, it proved impractical during this preliminary study to separate the sabethines by species previous to feeding and injection.

Twenty-one of 88 specimens in a mixed group of *Sabethoides*, *Limatus*, *Wyeomyia*, *Goeldia* and *Trichoprosopon*, caught together with the first lot of infected *Haemagogus* at Bemposta and Pedro do Rio, February 24, fed on Monkey 9. This monkey developed no evidence of infection or immunity. The inoculation of

the supernatant fluid from an emulsion of the 88 mosquitoes, however, produced encephalitis in mice. Second mouse-passage material produced infection in Monkey 4A with circulating virus and the production of specific immunity.

These results show that one or more of the 88 specimens in this group had fed on an infected person or animal before capture. The negative results in Monkey 9 may have been due to failure of infected mosquitoes to feed, to the non-completion of the incubation period of the virus in the mosquito or possibly to inability of the infected species to transmit, even though capable of conserving the virus for long periods of time.

The evidence presented incriminates two species of forest-inhabiting mosquitoes, *Aedes leucocelaenus* (D. and S.) and *Haemagogus capricorni* (Lutz), as natural vectors of yellow fever, and indicates that one or more species of sabethine mosquitoes may harbor the virus of the disease without definitely implicating them in actual transmission.

R. C. SHANNON
LORING WHITMAN
MARIO FRANCA

THE TREATMENT OF SPONTANEOUS TUMORS IN DOGS BY THE INJECTION OF HEPTYL ALDEHYDE¹

FOLLOWING the observation that the addition of heptyl aldehyde to the otherwise normal diet of mice harboring spontaneous carcinomas of the mammary gland brings about liquefaction and certain retrogressive changes of the tumors without injury to the animal by such treatment,² it seemed logical to test out the possibility that dogs suffering from spontaneous tumors might respond in a similar manner. The amount of material needed, however, to bring about retrogressive changes in tumors in mice by the addition of the material to the diet would be entirely too great for practical purposes in dogs. Consequently, the subcutaneous injection of small amounts of heptyl aldehyde has been injected into dogs (from 0.10 to 1.00 cc at a time). Injection of the material into mice was found to be impractical for the reason that ulceration at the site of injection invariably occurred. Even though liquefaction of tumors in mice was brought about by the injection of heptyl aldehyde at remote spots, this local reaction interfered with subsequent injections and even with complete recovery of the mouse from a single injection. Due, perhaps, to the tougher skin of the dog, local sloughing of tissue is not pro-

¹ This experiment has been made possible by grants from the International Cancer Research Foundation, the Anna Fuller Fund and from the Jane Coffin Childs Fund. The dogs have been kept under normal outdoor conditions in the Whitney kennels at Orange, Connecticut.

² L. C. Strong, SCIENCE, 87: 144, 1938.

duced by the injection of freshly prepared heptyl aldehyde. Extreme care, however, of keeping the heptyl aldehyde free of excessive decomposition products has always been employed. A temporary edema was produced with the larger injected doses.

So far, ten dogs with various types of spontaneous tumors have received periodic injections of heptyl aldehyde. Improvement of the dogs by body weight increase, physical appearance and general activity has been the rule in all cases. Softening of the tumors (with complete regression of the mass in several dogs) has been obtained in all dogs, except one that has a mammary gland tumor which is heavily infiltrated with calcium. The same type of liquefaction has been obtained in dogs as was had in the tumors of the mammary gland in mice. Following periods of softening and of draining of clear fluid, the tumors as a rule have gradually disappeared.

Injections have usually been performed at sites remote from the tumors. In a few cases, however, when the tumor was large (the size of a baseball or larger), the first injection was performed directly into the tumor and this was followed, when the tumors began to slough off, by injections at remote sites to the tumors.

The details of this investigation shall be published within a reasonable time. The data so far obtained, however, are so encouraging that this note is published.

The first two dogs with spontaneous tumors (both fibroadenoma of the mammary gland, as indicated by biopsy) which have been given the present treatment of the injection of heptyl aldehyde warrants further comment. One dog, a cocker spaniel female, eight years old, had numerous hard nodules throughout the mammary gland. These ranged in size from a pea to a lump 2.5 inches in diameter by $\frac{5}{8}$ inch thick. A mass 2 inches in diameter had been removed by operation a year previously. The dog had not had a normal heat period for more than two years. For example, at her last period in August-September, 1937, she had remained in heat for at least 40 days, during which time she accepted a male eight times over the entire period without any signs of pregnancy. Two months following the start of the first treatment with heptyl aldehyde she had a normal heat period. She was bred to a male normally and twenty-four days later, she had normal size embryos. These embryos subsequently became resorbed—a phenomenon which is not surprising when it is realized that heptyl aldehyde in mice acts as an abortifacient. This resorption of embryos may, however, have been due to the age of the dog. The dog has gained weight and is in normal health at the present time without any sign of tumor. The second dog, a Scottish terrier of similar age, had a solitary nodule in the breast about the size of a small

orange. After several treatments with heptyl aldehyde (remote to the tumor) the mass completely regressed. The dog has gained weight and is apparently in normal health, having since treatment had a normal heat period, whereas, previously she had a long history of prolonged and abnormal heat periods with numerous failures to conceive.

It is realized that spontaneous tumors in dogs do occasionally regress. It is also recognized that many dogs do continue to grow their tumors until death results. The proper analysis and evaluation of the present data must wait until statistically significant numbers are obtained. The data so far obtained are noteworthy, and it is planned to carry on the work on a larger series of dogs and other animals suffering from spontaneous tumors.

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RELATIONSHIP BETWEEN MEAN SEA LEVEL AND SAND MOVEMENTS¹

At the Scripps Institution of Oceanography there is a 1,000-foot pier, extending from a sandy beach out into the open ocean. For two years, weekly measurements of sand elevations were made from the pier to determine the beach profile and the changes in sand elevation. These observations were taken at stations 20 feet apart, along the length of the pier. Since October, measurements have been made daily, and during one 36-hour period, on October 20 and 21, these measurements were made every 40 minutes.

Continuous readings of sea level are available from the Coast and Geodetic Survey tide gauge, located on the end of the pier. Averaging these hourly sea level heights for days, weeks and months gives the mean sea level for these periods. The distances from the deck of the pier to the sand at 50 equally spaced stations were averaged for the same periods. Both mean sea level and mean sand level show considerable variation. The accompanying figure shows that there is a decided relationship between the two.

It will be observed that a rise or fall in mean sea level is accompanied by a rise or fall in the mean level of the sand. The average ratio of these changes is roughly 3 to 1, that is, a rise of one foot in mean sea level is accompanied by approximately a three-foot rise in the mean level of the sand. The agreement of course is not perfect, and some instances of marked deviations will be observed.

These changes show a distinct relationship to the seasons during the two-year period. It will be noted

¹ Contributions from the Scripps Institution of Oceanography, New Series, No. 7.

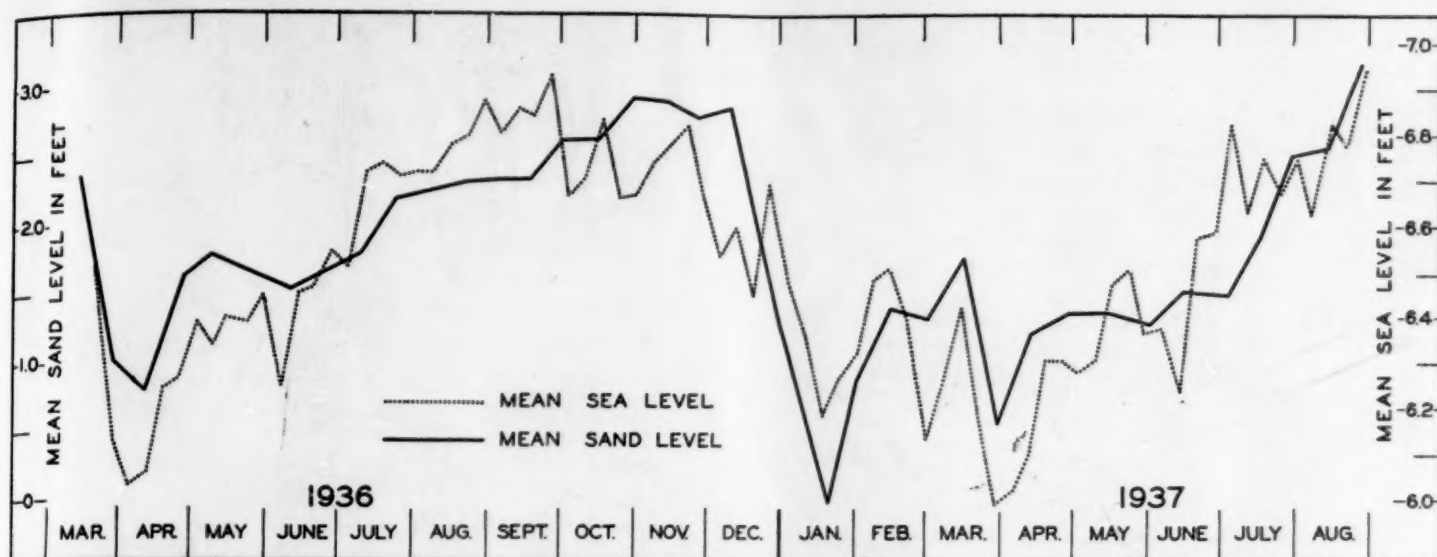


FIG. 1. Relationship between mean sea level and mean sand level. Sand level is expressed in feet above the lowest level and sea level is the tide staff reading in feet.

that there is a rise each summer and fall and a decline in winter and spring. However, it is not only in these large seasonal changes that the agreement of the two curves is found. Changes in shorter periods can be observed, as, for example, the rise in February and March, 1937. Furthermore, the changes in tide level during the 36-hour survey, when observations were made every 40 minutes, showed that the variations of tide level were closely associated with the fill and cut of sand along the pier.

The causal relationship of these changes to each other is not easily understood. It should not be concluded that the rise in sea level alone causes a building up of the sand, but many of the factors which influ-

ence the sea level must likewise affect the sand movements. It seems likely that changing currents and winds which affect sea level must have similar influence upon the sand movements. Such an influence may be increased by large swells which tend to occur during certain wind directions and which stir up the sand and keep it in suspension.

Continued observations, which include current studies, wave height observations and meteorological data, together with the sand measurements, which are now in progress, may be expected to throw more light upon the underlying cause of this relationship.

EUGENE C. LAFOND

SCRIPPS INSTITUTION OF OCEANOGRAPHY

SCIENTIFIC APPARATUS AND LABORATORY METHODS

A SUBSTITUTE FOR CARGILE MEMBRANE IN THE CONSTRUCTION OF BRODIE BELLOWS

VOLUME recorders of the bellows type have a wide variety of application in physiological experiments, but their construction as described by the originator, Brodie, and subsequent experimenters, involves the use of Cargile membrane for the actual bellows. Cargile membrane is the peritoneum of an ox and has been used by surgeons and goldbeaters, but unfortunately it is now both difficult to obtain and quite expensive. A search was therefore made to find a suitable substitute.

We found that the Japanese tissue paper which is used in model airplane construction when properly prepared works most admirably. Since the heavier types of this tissue are too stiff and tend to crack when folded, it is important that only the thinnest and toughest variety be used.

The tissue is prepared for use in the following manner: Care being taken to avoid wrinkles, a section of

the paper is placed over the open end of a tin can or other container of suitable size and shape and glued at the edges with banana oil. With a tuft of cotton the entire surface is gently moistened with water. This serves to align the fibers and stretch the tissue. In order to render it impermeable to air and moisture it must then be treated at least three times with a mixture of one part banana oil and five parts acetone. This is done by simply brushing the mixture on gently with a soft brush. The membrane may then be removed and will be found to be smooth and flexible.

The construction of the bellows is self-evident from the illustration, but great care must be exercised in applying the membrane so that it folds smoothly and without bulging out when the bellows is in actual use. Most efficiency was obtained when the membrane was first cemented on so that it formed the sides of a box the top and bottom of which are the metal surfaces (A). The sides are then gently pushed in with thumb and forefinger so that they fold as in (B). Now, at one end the metal top is pushed down to form an angle

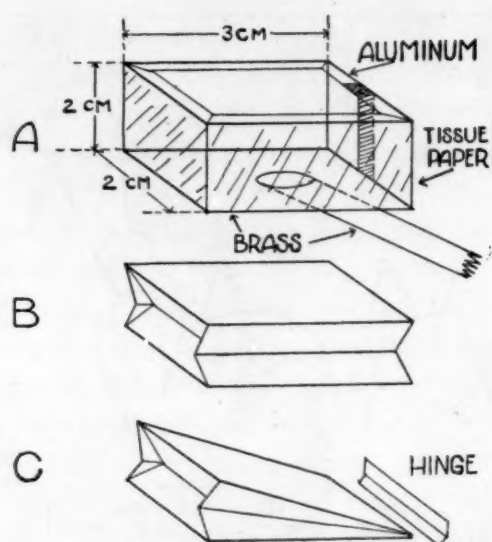


FIG. 1

with the base and a membrane hinge is cemented on (C). A writing lever (not shown in the illustration) is attached to the top surface. The bellows is now made ready for use by smearing generously a layer of paraffin oil on the membrane, thus not only sealing any microscopic holes, but rendering it more flexible.

These bellows may be made of any volume capacity to fulfil a particular condition of recording. It should be remembered that the more cubical the bellows is made, the more amplitude will be recorded for a certain volume change, and thus it is more sensitive but has less mechanical advantage. A useful proportion is shown in the illustration.

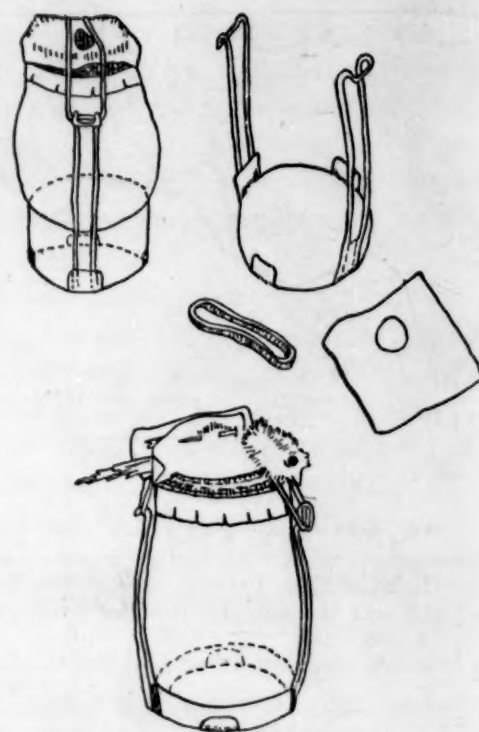
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A SIMPLE FEEDING DEVICE FOR CULEX PIPIENS IN AVIAN MALARIA STUDIES

THE meticulous and rather laborious procedures required for satisfactory continuance of the mosquito-canary propagation of plasmodia in the laboratory suggest that any simplification of methods should be placed on record. The accompanying rough sketches show a device which has been very helpful in my own work through (1) eliminating the possibility of loss of mosquitoes by the toppling of a lantern globe off a Petri or crystallizing dish, and (2) providing a "bed" in which the bird lies very comfortably, indeed often quietly asleep, while the mosquitoes are feeding. There are, as shown, three simple parts to this device: first, a round flat base cut with shears from light-weight galvanized iron and having four projecting portions turned up at right angles, two of these latter supporting upright hooks of stiff wire soldered against their outer surface; second, a small piece of rubberized cloth with a hole cut in it eccentrically; and, third, a rubber band. Without cloth, the band stretched between the two hooks holds the globe and dish securely together; for blood feeding, the cloth is slipped be-

FIG. 1. A simple feeding device for *Culex pipiens* in avian malaria studies.

neath the strands of the band, the bird is laid between the strands with its bared pectoral region over the hole, and the two sides of the cloth are brought together on top and held in place by a pin.

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